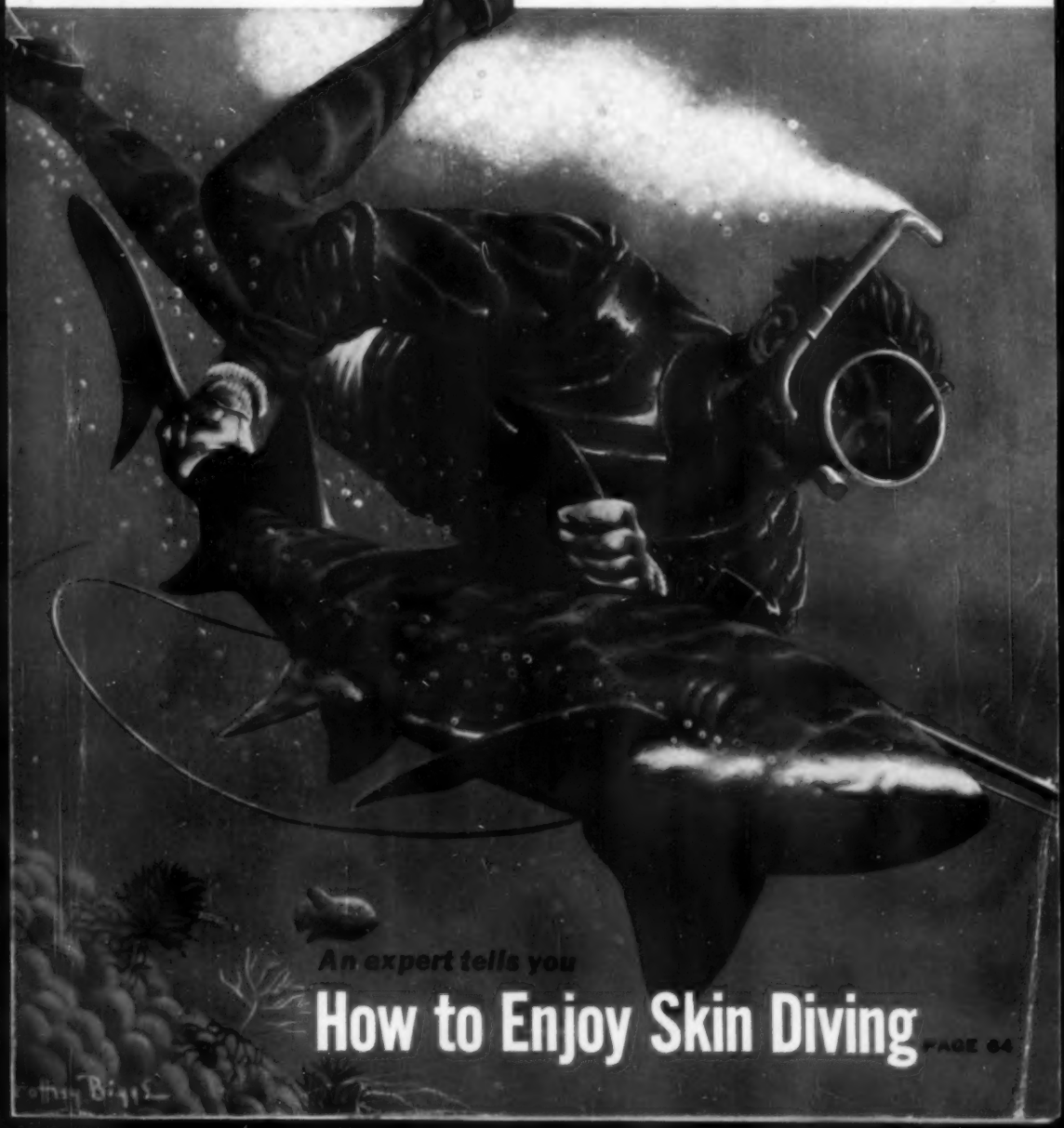
MECHANICS · AUTOS · HOMEBUILDING

POPULAR SCIENCE

July 35¢ MONTHLY



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How to Enjoy Skin Diving

PAGE 64

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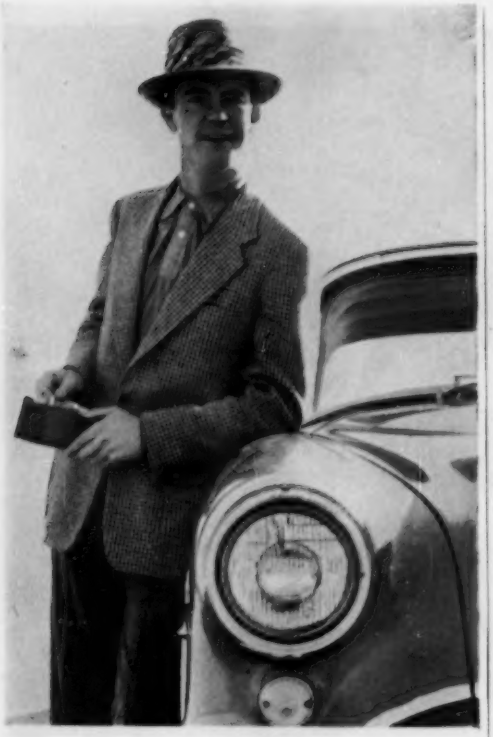

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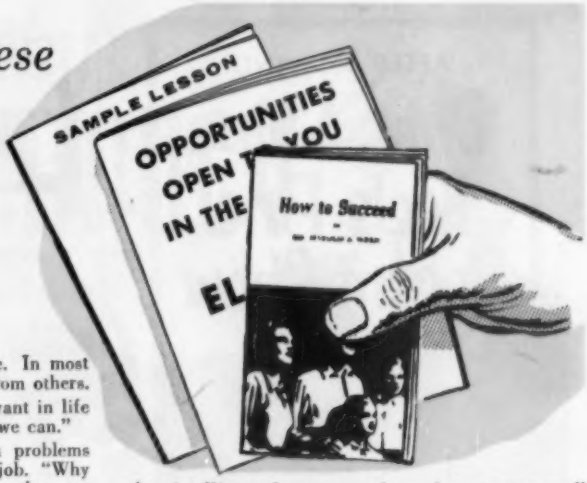

Life's problems are never simple to solve. In most cases they require help and inspiration from others.

It was Emerson who said—"Our chief want in life is somebody who shall make us do what we can."

Perhaps one of today's most common problems has something to do with an individual's job. "Why can't I make more money?"..."Will I be the next to be fired?"..."Why are others promoted over me?" are some of the questions that plague most of us at some time or another.

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National Safety Council, Chicago

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Back home in Linden, N. J., automatic accounting for toll calls—to nearby New York and New Jersey areas—has been in effect for some time. About two months ago, nationwide dialing was begun from that city.

It seems to me that this expansion by the phone companies is really just an insidious capitalization on the natural propensity of us humans to chatter a little longer on the

phone, especially when you can dial California with 10 pulls of the dial, and it doesn't even seem like a long-distance call at all.

ELI NADEL, Philadelphia

Praise from Britain

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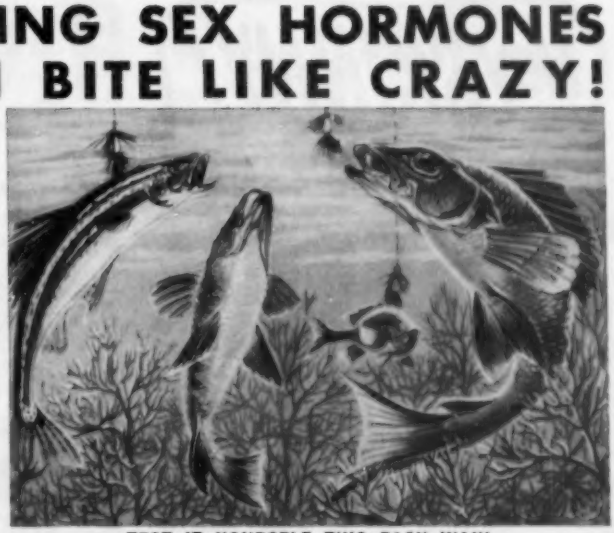

SCIENTISTS DISCOVER STRANGE HABITS OF SEA LIFE

Man has been fishing since the dawn of time. Yet during countless centuries he's never really known much about sea life. Then leading scientists from all over the world got on the job, including the U. S. Dept. of Fisheries, Ichthyologists, chemists, zoologists and sportsmen joined in the quest. Millions of dollars were spent on gigantic glass aquariums, sub-marine cameras, recording devices and lab equipment. In less than a generation man learned more about the mysteries of sea life than in the previous 10,000 years!

EXPERIMENTS PROVE FISH ARE ALMOST BLIND

Here is the most startling discovery that the scientists unearthed: most fish—of ALL species—have very poor eyesight compared to birds and mammals. Some are almost blind! No wonder, then, that you can use the most attractive dry lures—yet go home after a day's fishing excursion with little to show for it but a sunburn!

It doesn't make much difference how good the bait is you use nor how hungry a fish may be—if he doesn't SEE it, if he isn't DRAWN to it, you won't get a nibble! And test after test proved that unless you get the lure right under the fish's nose, you simply cannot attract him to your hook!

NEW SEX-HUNGER FISH LURE DEVELOPED BY GERMAN CHEMIST

The new **Lurene** formula was developed by a German chemist, a graduate of the University of Tubingen in Wurtemburg, Germany. An acknowledged leader in his profession, he knew that certain lures and bait failed simply because many fish were nearly blind. But he learned that Mother Nature in her bounty provided fish with extra powerful sense-instincts that led them irresistibly to their food supply.

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No elaborate equipment required! An ordinary glass aquarium tank and ANY species of fish will prove this new method really works! Drop in 2 or 3 lines with your favorite bait. Treat only ONE with the new LURENE "triple-instinct" preparation. It's the same bait . . . the same lures . . . yet right there before your eyes you'll be witnessing a fascinating spectacle! You'll hardly believe your eyes! The fish, as if compelled by some unknown power are drawn to the Lurene-treated line. This article explains how this "triple-instinct" in fish can increase your fishing luck.

This sense-instinct for want of a better name may be called **Smell-Taste.** In other words, a fish both **SMELLS** and **TASTES** at one and the same time! For this purpose, the bodies of fish are covered with thousands upon thousands of tiny smell organs—without which life would be impossible. Armed with this knowledge, the eminent chemist finally developed the now famous **Lurene** formula.

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Scientists have long known that the sex factor is one of the most compelling instincts in sea life. Fish go to fantastic lengths to fertilize their eggs. They travel countless miles to fertilize them—go through incredible torture, accomplish almost impossible tasks. One of the most wondrous sights of nature is to watch male salmon struggle up river fish-ladders to fertilize the spawn. NOW—for the first time ever—natural sex hormones have been added to the new **Lurene** formula. This has increased production costs considerably—but you'll agree after using it that it's certainly worth it! And it's SO easy to use—just dab a little on the plug or bait, drop it in the water and fish as usual. LURENE works in lakes, streams, ponds or in the ocean. It makes no difference if you still-fish, troll, cast or spin. **Lurene** disperses in the water, giving you greater **penetration,** longer **range** and far more **attraction power.**

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FAMOUS SPORTS EDITOR PRAISES LURENE FORMULA

Millions of readers follow Walter S. Miller's sports column, "Rod, Gun & Lens," which appears in over 15 metropolitan newspapers. He tests new products thoroughly, warning readers against shoddy, defective articles but also giving praise where praise is due. This is what this great sports authority says about LURENE:

"Recently a product called 'Lurene', a prepared bait oil came into my possession with instructions to test it and pass on my opinion to you. Accordingly here are the results on several such tests.

"Using an artificial lure of the spoon type in salt water the number of casts per fish was 27. With 'Lurene' the number of casts per fish was 9. Accordingly this product is active enough to salt water fishermen since tests prove it will triple your catch regardless of type of fish. Again using an artificial lure of the spinner type in fresh water the number of casts per fish was 50. Using 'Lurene' the number of casts per fish was reduced to the phenomenal low of 10 casts per fish. The results proved beyond doubt that in fresh water 'Lurene' quintupled the catch. I heartily endorse this product."

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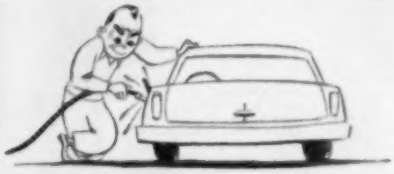
duction POPULAR SCIENCE is. I remember being fascinated with it as a boy 30 years ago, and its appeal is as strong now as it was then.

L. M. FORBES
Scott Polar Research Institute
Cambridge, England

Water Cure for Gas Thief

Irked because some stinker kept swiping gasoline from my tank, I drained the gas



out and then filled up the tank with water.

Yep! Police caught the culprit a mile out of town—stalled because of the watered gas in *his* tank!

HENRY JOSEPHS, Sarasota, Fla.

Twin Carbs Make the Difference

You said the 1955 Plymouth L-head six has 117 hp. and 194 lb.-ft. of torque and the Dodge L-head six has 123 hp. and 194 lb.-ft. of torque [Jan., p. 148]. According to specifications they are the same engines. How come the Dodge has six more horsepower and the same torque?

MICHAEL HIRSCH, Bronx, N.Y.

A Chrysler Corp. spokesman explains: "The Dodge engine is equipped with a two-barrel carburetor, where the Plymouth engine has a single-throated carburetor. The effect is to increase the amount of the fuel-air mixture that the engine can ingest at high revs, giving an increase of about six horsepower."

Americans Dream Up Trick Watches

I was most interested to read the George Kent article in your May issue on Swiss watches [p. 144]. A fine job in most respects.

It is too bad, however, to give the Swiss all the credit for unusual watches. They make them, without question, but do not always dream them up. Mr. Kent says, "They have worked out special watches for . . . tide-tellers. They have produced watches with concentric dials that give you solar time, lunar time, and the time anywhere in the world."

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"I've come a long way in Radio and Television since graduating. Have my own business on Main Street."—JOE TRAVERS, Asbury Park, New Jersey.

"Manager of meat market when I began. Answered ad for Radio serviceman. Got job. Pay increased 50% in year."—C. CARTER, San Bernardino, California.

"Am with WCOC. NRI course can't be beat. Passed exam for first class Radiophone license with no trouble at all."—JESSE W. PARKER, Meridian, Miss.

"Am with WNBT as video control engineer on RCA color project. Owe a lot of my success to your textbooks."—WARREN DEEM, Malverne, N. Y.

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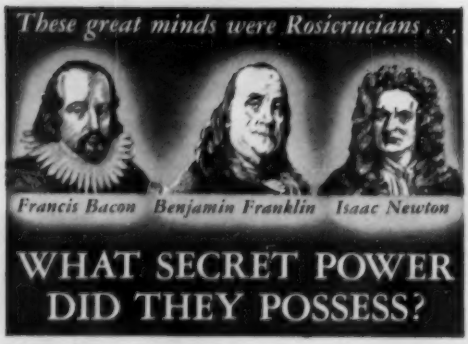

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the world to tell lunar time (not phase of the moon), actually timing the lunar cycle . . . and the only ones to give the tidal cycles in terms of high and low day-after-day are the Seafarer Chronograph and the Solunar Watch. Both of these are covered by a U. S. patent issued to me.

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WALTER S. HAYNES, Vice-President
Abercrombie & Fitch Co., New York

Independent Cars Defended

Your April issue gives a few lines to Eric Reisfeld of Silver Spring, Md., who obviously has no idea of what he is talking about. [In Letters, p. 12, Mr. Reisfeld criticized "independent" auto makers for not being independent enough.]

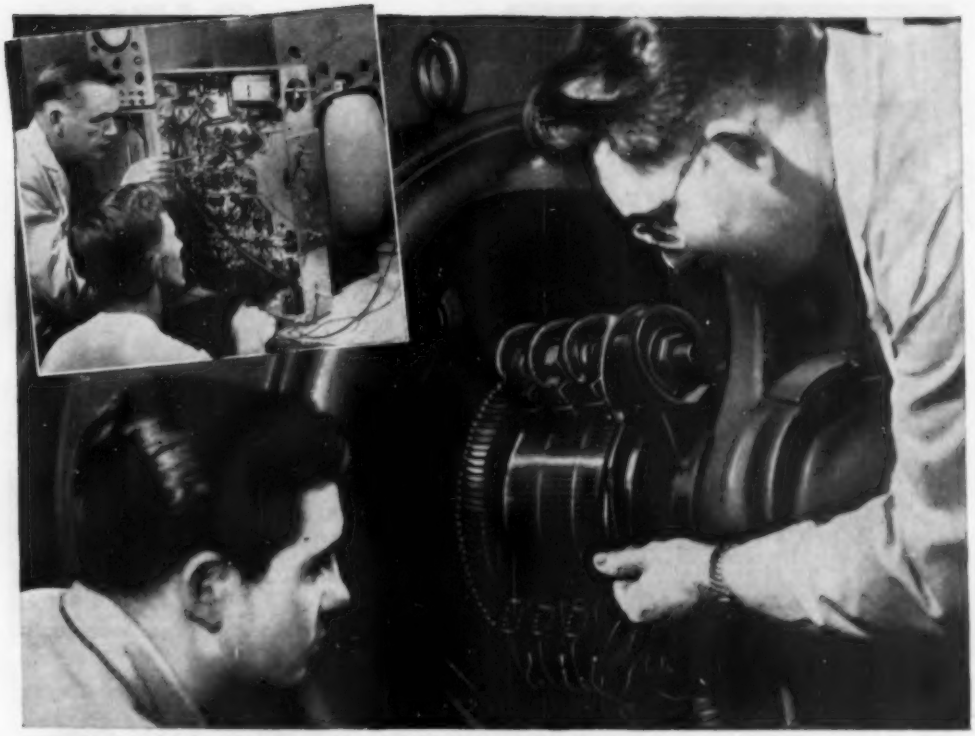
Let's take just Nash, now American Motors. Where else in the industry does one find a unit-construction body; where does one find a heater equivalent to the Weather Eye, which I know from my own experience to surpass any other automobile heater on the market? Where will one find an engine as efficient as the Ambassador overhead six?

ERIC A. WICKMAN, Paramus, N.J.

Here are a few things Reisfeld overlooked. The styling of the Nash, Hudson and Packard is entirely different from any of the Big Three. Did he ever get the power and pickup the Nash gives with motors 25 to 50 percent smaller and gasoline savings of 25 to 50 percent over any of the Big Three? Did he ever ride a five-year-old Big Three car without the doors rattling? He has a surprise coming when he rides an all-welded steel-body Nash.

Does he know that the Hudson has mechanical brakes to bring the car to a safe stop should his hydraulics fail? This year's Packard is no slouch either.

N. BERGMAN, Port Monmouth, N.J.



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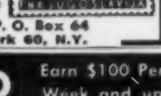

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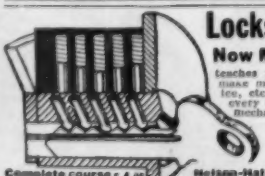

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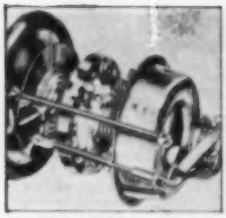

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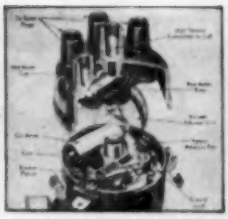

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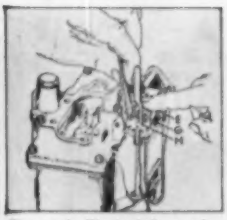

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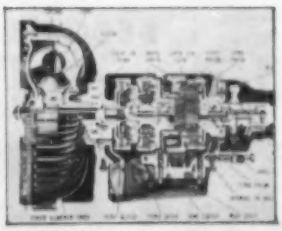

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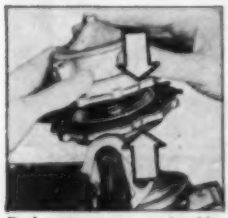

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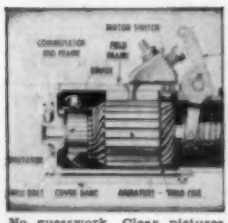

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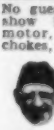

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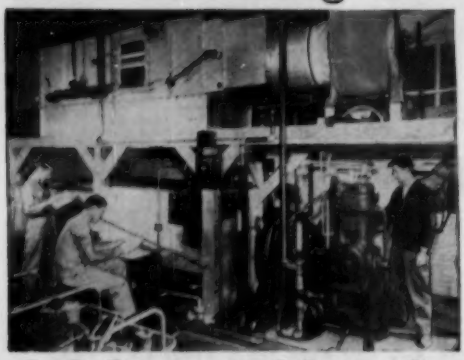

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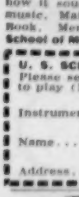

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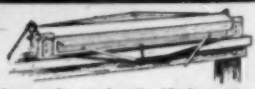

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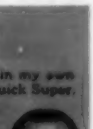

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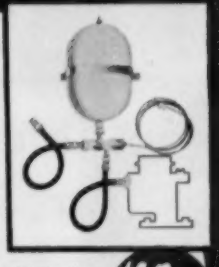

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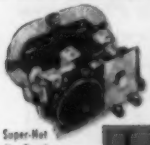

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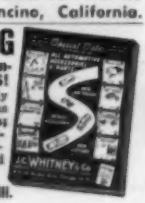

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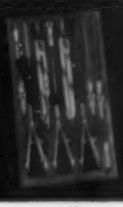

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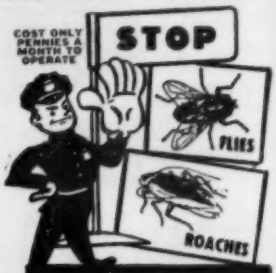

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WALKIE-Talkie. Build wireless two-way portable radio-phone for less than $10.00. Plans 50c. Springfield Enterprises, Box 54-A7, Springfield Gardens 13, New York.

37 BUSINESS OPPORTUNITIES

RECAST old batteries into new. Latest achievements. Battery Laboratories, Minneapolis.

IMPORT-Export! Opportunity, profitable, world-wide, mail-order business from home, without capital; or travel abroad. Established World Trader ships instructions for no-risk examination. Experience unnecessary. Free details. Mellinger, E691, Los Angeles 24.

MEN Wanted—Build Luggage And Cases At Home. We sell your products—supply complete instructions, materials, everything. No special equipment needed. Free details. Casecraft 805-HT Sunset, Los Angeles 12, Calif.

WE Love our mailman. He leaves over $1,000.00 monthly in our rural mailbox. My college professor husband drafted a scientific home mailorder method. We bought a Texas ranch, live as we always wanted. Now we sell the "Ranch Mailorder Method." Operates anywhere. Inquire: Eveningshade Ranch, Helotes, Texas.

FREE! "301 Profitable Small Businesses!" Amazing shoestring plans! Work Home! Start Sparetime! Deumant Surveys, Kenmore, 23-S, New York.

$1,000 MONTHLY possible in collection agency business. Free details. Write Cole Associates, Syracuse 2, New York.

GROW Orchids at home—profitable—fascinating. Year 'round. Maine to California. No Greenhouse. Gorgeous Cattleyas, Cymbidiums, etc. Successful home grower shows you how. Free—full details. Flowerland, 4622-VA, Wilshire, Los Angeles 5.

OPERATE profitable mail order business. Write Walter Service, 4159-B East 112th, Cleveland 3, Ohio.

VENDING Machines—No Selling. Operate a route of coin machines and earn amazing profits. 32-page Catalog Free! Parkway Machine Corporation, Dept. 73, 715 Ensor St., Baltimore 2, Maryland.

$25 WEEKLY working two hours daily at home. Lycke, Box 2471-B, Cleveland 12, Ohio.

BRONZE Baby Shoes. Instructions, Equipment and mountings for genuine electroplated process. Free catalog. Hollywood Bronze Supply, Dept. B-1, 1624 East First Street, Los Angeles 33, California.

ENVELOPES addressed accurately, reasonably. Fast service. We have capable addressers in your city. Gleaway System, 5713 Euclid, Cleveland 3, Ohio.

NEWEST Spare, Full-Time Home Business. $5 to $10 hour possible. Paint with suede—the finish with touch And eye-appeal. Beautify auto dashboards, signs, radios, toys, figurines, lamps—1001 others. Complete, Step-By-Step Instructions sent for no-risk examination. Free details. Coast, Los Angeles 61.

MEN —Income from local information. No selling. Neherco, LaVerne 6, California.

NEED More Money To Live on? Increase your weekly income $20 to $25 or more in spare time. Supply Rawleigh Products to Consumers. Also openings for full time Dealers. Write Rawleighs, Dept. G-DD-PSC, Freeport, Ill.

MAKE extra money. Address, mail postcards. Spare time every week. Write Box 174, Belmont, Mass.

BE appointed state notary public now. Write—Stationers, Helotes, Texas.

GROW Herbs & Spices (50 different kinds!) at home for fun or profit. Millions $$ worth used yearly in foods, drinks, cosmetics, perfumes, medicines, etc. Help fill huge demand. Successful home grower shows you how. Free—full details. Herb Land, 601-CR So. Vermont, Los Angeles 5, California.

HOW and where to obtain Capital? Free details. Star Service, Wapakoneta, Ohio.

YOUR Own name brand business. No investment; no inventory. Part time or full time. Sell famous brands of appliances, housewares, silverware, radios, vacuum cleaners, lamps, tools, clocks, watches, jewelry, etc., etc., over 1,000 items. Join thousands of successful independent dealers. Send for Free catalog and dealer price list. H. B. Davis Corp., Dept. F, 145 W. 15 St., New York City.

BECOME A game warden, professional hunter! Join forestry, park, fishery services. Good pay! Opportunities open! Free! —revealing "Select-Job Chart," details, job-getting secrets. Write "Home-Study Institute" JY, Los Angeles 19, California.

"MAKE Perfumes," other products—Sell mailorder—Formula Catalogue Free. International, 6347 Parnell-PS-6, Chicago 21, Illinois.

$200 WEEKLY Cleaning Venetian Blinds. Free book. Burtt, 2434B, Wichita 13, Kansas.

$1,000 MONTHLY, home, mailorder, free advertising method. Revealing information. Seidel, 6000-BG Sunset, Los Angeles 28.

BIG Profits with your imagination. Start national business from home promoting your own products or ideas. Details free. Banning B3 40 South LosRobles Avenue, Pasadena 1, California.

ADVERTISING book matches—Cash in on big demand—sell Union Label matches. Cuts for all businesses and political parties—Free powerhouse selling kit—low prices—protection guaranteed on repeat orders—Cash Commissions. Superior Match Co., Dept. PX-755, 7530 Greenwood, Chicago.

LIQUID Rubber makes flexible molds. Free Sample. Chaney, 1130 E. 16th St., Jacksonville 6, Fla.

EARN $8,000-$20,000 yearly servicing radiators with modern equipment by world's largest manufacturer. Pays-for-itself financing available. $100 training course free. Write today. Inland Mfg. Company, Dept. PSC-7, Omaha, Neb.

MAKE Money at home addressing envelopes. Leon Duquette, 97-A Snow, Fitchburg, Mass.

MINK Raising information free. Complete. Lake Superior Mink Farm, Superior E ES, Wisconsin.

CHINCHILLAS. You Raise Them. We Buy Them. Small capital can show terrific profits at home in spare time. Free booklet explains our new lease plan. Box 97, Little Neck, New York.

WORK from home in spare time. Start profitable magazine renewal service. We show you how; furnish everything Free. No experience needed. Write McGregor Magazine Agency, Dept. 510-B, Mt. Morris, Illinois.

GOOD paying business silvering mirrors, plating articles in the shop and home by late method. No tanks or shop required. Free booklet. Gunmetal Co., Avenue E, Decatur, Illinois.

WANT To Make Big Money At Home? $5 profit in an hour possible with Invisible Reweaving. Make tears, holes disappear from clothing, fabrics. Steady year-round demand from cleaners, laundries, homes. Details Free. Fabricon, 8338-S Prairie, Chicago 19, Illinois.

GROW Expensive herbs for us! Big profit home-business of your own. Year around profitunity! We supply everything necessary! Send for Free Rare Seeds and Revealing Plan. National Herb Exchange, Dept. B-7, Gardena, California.

START A Buying Service, buy wholesale thousands nationally advertised products. Make big profits selling at sizeable discounts. Postcard brings details. American Buyers', Hertel Station, Buffalo 16-N, N. Y.

FIX Typewriters Inexpensive home course teaches Factory Secrets. Free Booklet. Write, Typewriter, Tarentum 2, Pennsylvania.

"URANIUM" Located everywhere! Strike-it-rich! Learn prospecting secrets! New fascinating correspondence course available now! Free details and revealing map! Write Uranium League, 1036-FJ, So. La Brea, Los Angeles 19, California.

WHOLESALE Catalog! 30-80% Discounts! Typewriters, Appliances, Housewares, Watches, Jewelry, etc. Consolidated Distributors, 21-15 Lafayette, Paterson 15, New Jersey.

RISKLESS Wholesale Moneymaker. Sensational discounts. Markoff, Box 42228, Washington, D.C.

OIL Millionaire. How to become one. Write Texas Oil Associates, Box 486-B, Wichita Falls, Texas.

MOTELS and Resorts. Mature men and couples trained for management positions. Placement service. International Motels, Millbrae, California.

YOU for President of your own collection Office. Free details. Franklin Credit, Roanoke (7), Virginia.

THRILLING Profitable Home Business. Make fast-seller chenille monkey trees, dolls, flowers. Terrific holiday demand. Information free. Velva, Bohemia 17, N. Y.

TO $50.00 weekly. Sparetime, home operated mailorder business. Successful "Beginner's" plan. Everything supplied. Lynn, 10420-C National, Los Angeles 34, Calif.

WANTED! Home Producers, by manufacturers in our Clearing House Service. Become subcontractor, casting plastic products for these companies. Thousands of easy-to-make items required for consumer-industrial use. Cash in at home, without previous experience. Plastic Service Associates, Dept. 7-PS, East Boston 28, Massachusetts.

OPPORTUNITY To earn $15,000 or more annually. Business of your own. Self-employed. Franchise protected and guaranteed. Live at home. No merchandise to buy. One of the most exclusive and noncompetitive businesses in United States and Canada. Send for free explanatory booklet. Harrell & Company, Box 8-D, Louisville, Illinois.

OPERATE franchised office. Minimum income guaranteed. Small investment required. Personnel Guide, 518 New York Bldg., St. Paul 1, Minnesota.

INVESTIGATORS wanted. Work furnished. Build a business. National Correspondent Service, 1754 Van Buren, St. Paul 4, Minnesota.

WHOLESALE! Musical Instruments, Phonographs, Recorders, Watches, Appliances, etc. Discounts to 75%! Large Catalog 50c (Refundable). Strauss Music Company, 25-14, Lafayette, Paterson 23, New Jersey.

REBUILD Batteries; Repair dolls; Make rubber stamps. Catalogue "60 Ideas" Free. Universal, Box 1076-B, Peoria, Ill.

NATURAL molding rubber, extra thick. Free sample. W. Wooley, 115-B, Donald, Peoria, Illinois.

$4,000.00 PROFIT in two months. No investment. Details 50c. Charles Company, 12-EDM, Norwood, Ohio.

BANANA Syrup Business—Formula $1.00. Amark, 101 Weld, Rochester, New York.

STEADY Profits, home-operated business. Simply add water to concentrates. Make waterless hand cleaner, chrome renewer, etc. Free samples. Western G Aircraft, Los Angeles 19.

AGENTS wanted for newly invented 6 colored bulbs flashlight $1.15. Car Visor Carryall $1.35. Famous electric shaver $1.85. Terrific Shaver $1.85. Terrific sellers. Make $200 weekly. Free advertising supplied. Write, Turner Company, 1170 Broadway, New York 1, New York.

LEARN Sewing Machine Repair. How to make "Big Money" at home sparetime. New machines—"Everything"—Supplied. Write Taylor Service, Box 2126, San Bernardino, California.

BREED Rare Tropical Fish at home. Earn Big Money! Learn Secrets! Help fill huge demand. Amazing Opportunity! Free Plan. Tropical Fish Breeders, Los Angeles 61, Calif.

POPCORN and Potato Chip Equipment. Eakins, Box 933-BS, Springfield, Ohio.

DOLLARS: Baby record books, Kitty Kat shoes, Hollywood souvenir cards, eleven thousand new prospects daily, sold by mail, use our literature. No-Co-Ro, Oakland 6, California.

FORTUNES Made raising crickets and fishworms. Write for free information. Carter Worm Co., Plains, Georgia.

GROW Mushrooms. Cellar, shed, and outdoors. Spare, full time, year round. We pay $3.50 lb. We paid Babbitt $4,165.00 in few weeks. Free Book. Washington Mushroom Ind., Dept. 178, 2954 Admiral Way, Seattle, Washington.

YOU can be president of your own company without capital or experience. We ship orders under your name—supply catalogues etc. Postcard brings booklet "Ten Ways To Make Money In Your Own Business" absolutely free. Topval, Lindenhurst 421, New York.

MONEY in new greaseless doughnuts. Start in kitchen. No smoke. Sell stores. Free recipes. S. Ray Co., 3605 South 15 Ave., Minneapolis 7, Minn.

HAVE Home Mail Business—Get $10 Orders in Every Mail—Keep $8.00. Everything furnished. Hutchinson, Box 67-C, Dorchester 22, Mass.

SAVE 20% to 50%. Buy wholesale! Nationally advertised merchandise. Free details! Beecher Sales, Box 2161-E, Cincinnati 1, Ohio.

PLASTERCRAFT molds, liquid rubber, plasters, flocks, candle supplies. Catalog and manual free. Jayhawk Plasters, Blue Rapids, Kansas.

MAKE Money at home. Mail letters featuring select merchandise. Get $10. orders in every mail. 100% profit. Everything furnished. Write: Nu-Way Enterprises, P-Box-747, Detroit 31, Michigan.

DISTRIBUTORS—Large Profits. Terrific Repeat Orders. Unique Italian Brooms. Details free. Write P. S. Peacock, 915 Bryant Street, San Francisco, Calif.

FREE Electroplating information. Money Making Plans. (Formula included). Send postcard for your copy. Highly paid, interesting, uncrowded field. Plater E. Hyde, 327 West 120th Street, Los Angeles 61, California.

ESTABLISH Automatic shoe shine route. Jiffy Shine, 1630 South Second, Phila. 48, Penna.

BECOME Exclusive franchised distributor, agency operator. Opportunities nationwide. Information. National Franchise Reports, R-528, 333 Michigan Avenue, Chicago 1, Illinois.

SECURITY through Export Business. Expect something different. Complete setup from idea to success. Hermes, 152—R West, 43, New York City 33.

MAKE tough, attractive building plastic, easily. $8½ Waste—101 uses—800% profit. Exclusive district. Grab it. Bays Laboratory, Oklahoma City 9.

EARN $2.00 Hourly, making and selling Sandals! Youngs, 1308-PS, South First, Arcadia, California.

LEARN Sharpen scissors. Profitable, easy instructions, $1.00. Box 85, Bronx Central P. O., New York 51, New York.

HOME Business mailing out catalogs. Write for Free Sample Catalog and Plans. Sutton Printing, Box 853-S, Waycross, Georgia.

BECOME Income Tax Consultant. Part-time Tax Experts earn to $20 an hour during yearly season, plus $2,000-$3,000 annually operating monthly Business Tax Service. We train you—help you start. State approved. Literature free. Union Institute, Lakewood 1X, New Jersey.

WANTED 2000 Men! Your own Business! No Selling. Free Booklet. Vest Company, 320 Summer Avenue, Newark, New Jersey.

WANT Up to $100.00 Weekly deposited in your mail box? Details Free! Smith, 2706-S Ladera, San Bernardino, California.

MONEY in our Mail Box Daily. Big City Rush is Over. We Live Easily in Florida. Plan used Works Anywhere. Details Free. Harley, Box 1396, Eustis, Florida.

STARTING mailorder business? Get the facts, every month from Progressive Mail Trade Magazine. Sample copy 25c to, Noll Publishing Company, 1200 South 13th Street, Springfield, Illinois.

$200 MONTHLY. No work. No selling. Plan $1 (refundable). Edmond Locklear, Jr., Pembroke, North Carolina.

BUY Wholesale sell on terms. Catalogs and samples furnished. Encore Industries, Box 247, Midland, Michigan.

ELECTROPLATE autoparts, novelties, mirrors, baby shoes. Easy, inexpensive home processes. Free booklet. Tyco Metals, Box 13231-CQ, Houston 19, Texas.

PRINT for Profit at home. Amazing new method prints colorful posters, banners, greeting cards, glassware—anything. Hundreds at time. No press needed. No art. Fantastic profits! Need representative your area immediately! Free home-business plan. Screen-Print, Dept. PS-7, Los Angeles 61, California.

WINNING Mail Order Plans, Merchandise, Books. Details Free. Mid-State, 214-K, Syracuse 1, New York.

MAKE money helping others get out of debt, stop garnishments, save jobs, reestablish credit. Details. Borum 87, 411 West Walnut Street, Kalamazoo, Michigan.

$70 WEEKLY Guaranteed—home, spare time. Simplified mail Bookkeeping. Immediate income—easy! Auditax, 34757DP Los Angeles 34.

FREE Folio "Up to $45,000; Unlimited Vacations." No merchandise, equipment. Unknown! Work home—sparetime! Haylings-815, Carlsbad, Calif.

MONTHLY repeat business which you can operate in your own community. For free details write Grassk, 321—28th Street, McKeesport, Pennsylvania.

COLORGLAZED Concrete pottery made without molds. Patented method. Cemetery products, novelties, tiles. Basement leak-sealing. Money-making projects. Booklet, details free. Men only. National Potteries, Grand Rapids, "Minnesota."

$250 WEEK reported! Free book "505 Odd, Successful Businesses." Work home! Expect something Odd! Pacific-36C, Oceanside, California.

UNUSUAL Opportunity. Spinning at home. Supplies, market, furnished. Angora House, PSM, Springfield, Illinois.

BUY Wholesale 450,000 Products. Literature Free. Carter, Box 6011-E, Chicago 80.

$3.00 TO $6.00 hour, serrating knives. Business investment $5.00. Free details. Semco, Inc., 16700 Woodbury, Cleveland 11, Ohio.

OPERATE profitable mailorder business. Everything furnished. Folder free. Thomas, 276 Weaver, Rochester 21, New York.

YOUR own business, samples, details $1.00. Jepson, 141 W. Robert, Salt Lake, Utah.

BUY it wholesale. Manufacturers. Distributors. Over 850,000 items. Literature free. Olsen 1231-B East Third St., Duluth 5, Minnesota.

EARN $35.00 Daily! Sell Liqui-Moly, new wonder lubricant for cars, trucks, buses, tractors. Used in jet engine, atomic energy plants. Nationally advertised magazines, newspapers, radio, television. Over 3,000,000 cans sold. Territories available. Write Liqui-Moly, 314 Scholes Street, Brooklyn, New York.

MAKE rhinestone buttons, hat pins, jewelry. Free catalog, bargain list. Send $2.25 for five gross rhinestones. Value $6.00. Ebert, Box S183, East Orange, N. J.

TIN-Cans. Turn them into cash. Twenty methods. Instructions 50c. Fender, Box 448-ABV, Kalamazoo, Mich.

GLASS-Bottles. Turn them into cash. Nine methods. Instructions 50c. Fender, Box 448-ABW, Kalamazoo, Mich.

I am no man's slave! You too can be independent. Samples, details $1.00. No manufacturing or selling. Fender, Box 448-ABY, Kalamazoo, Michigan.

LIVE as you want to. Be independent. No boss. Samples and details $1.00. Fender, Box 448-ABX, Kalamazoo, Michigan.

BUY Wholesale! 100,000 Name Brand Products! Save 66-2/3%! Big profits selling others spare time! Free Catalogs. National Buyers Service, Box 426FE, Oakland, California.

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INVESTIGATE Accidents! Many earn to $10,000 yearly. Thousands of insurance companies, airlines, and steamship lines need Claim Investigators. We train you at home spare time. Placement counsel and help. Free Book—Now! Universal Schools, Dept. B-7, Box 8202, Dallas 5, Texas.

38 MONEYMAKING OPPORTUNITIES

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MAKE money addressing envelopes sparetime. Glenway, 5713 Euclid, Cleveland 3, Ohio.

SELL-buy Titania Gems. More brilliant than diamonds. $9.75 carat wholesale. Free Catalogue. Diamonite, 1404-S Mitchell, Oakland 1, California.

EARN Ready Cash doing mailing work—No experience needed—Y. Wilson Business Service, 2875 Glendale Blvd., Los Angeles 39, California.

DETECTIVES—Work home—Travel. Experience unnecessary. Detective Particulars free. Write Wagoner, P-125 West 86th, New York 24.

MAN Wanted—Are you dissatisfied with your work? Would you like a business of your own? If so, write Rawleigh's, Dept. G-GG-PSC, Freeport, Illinois.

MAKE extra money. Address, mail postcards. Spare time every week. Write Box 174, Belmont, Mass.

EARN Money at home! Must have good handwriting. Write for details. Atlas, Box 188-P, Melrose, Mass.

SPARETIME Profits Taking Subscriptions. All Magazines. Wholesale Catalog Free. Cassell Publishers, Westfield, N. J.

MAKE Money growing miniature trees on your window sill. Free seed and plan. National Nursery, Dept. GC, Inglewood 4, Calif.

HUSBAND-Wife successful in mail order business. Details free. Chas. S. Edwards, 5100A East Side Avenue, Dallas 14, Texas.

WIN contest money. General Contest Bulletin gives hundreds of tips. Lists current contests and rules. Sample 25c. General Contests, 1609-A East 5th, Duluth, Minnesota.

NEW Comedy, religious, general 7" x 11" signs. 7c, retail 50c. 15 samples, $1.00. Lowy, 812 Broadway, Dept. 880, New York 3.

START A Buying Service, buy wholesale thousands nationally advertised products. Make big profits selling at sizeable discounts. Postcard brings details. American Buyers', Hertel Station, Buffalo 16-O, N. Y.

MINIATURE Trees. Why pay $2.00-$10.00 for growing secrets? Free Details. Tiny Trees, Box 3084-S, Chicago 54.

START Mailorder business. Small Capital. Details $1.00. Fred Hettick, Mgr., Box 1478, Bismarck, North Dakota.

WHOLESALE Catalog! 30-80% Discounts! Typewriters, Appliances, Housewares, Watches, Jewelry, etc. Consolidated Distributors, 21-17 Lafayette, Paterson 15, New Jersey.

PRINTING And office supplies wholesale. 20,000 items. Literature free. Royal, Box 368-S, Cleveland 27, Ohio.

$124.50 Weekly. Sparetime. Homework. Guaranteed. $1.00. Amazing Science, San Antonio (9), Texas.

LEARN Technical metaphysics and insure your future. Easy, inexpensive correspondence course. Simplest method known. Diploma. Write: Premier College of Technical Metaphysics, 2532 McKenzie St., Vancouver, B.C., Canada.

MONEYMAKING Opportunities with "inexpensive" Portable Sewshop Equipment. Zapart, 586-SM Manhattan, Brooklyn 22, New York.

90% PROFIT making "sparking" chipped glass signs. Easy to learn. Huge demand. Everyday a payday! Free details. Turpin Industries, 530 East Ashby, San Antonio 2, Texas.

FORTUNE In Diamonds Waiting For You! Details Free! Box 5091, Cristobal, Canal Zone.

OPERATE "Escolator" Mailorder System, selling our products or any products. Most revolutionary mailorder system known. Postcard. Selbyco, Decatur 170, Illinois.

OLD newspapers—21 uses—turn into cash—$1.00—money back guarantee. H. Crawford, Anthony, Kansas.

SELL Merchandise by mail. Everything supplied. Big profits. Details Free. Stull's Buying Service, 621 Adams Ave., Scranton, Pa.

MAKE to $4.50 hour doing common pen lettering. National Artists, 801½-C North Marsalis, Dallas 3, Texas.

GROW Mushrooms. Cellar, shed, and outdoors. Spare, full time, year round. We pay $3.50 lb. We paid Babbitt $4,165.00 in few weeks. Free Book. Washington Mushroom Ind., Dept. 179, 2954 Admiral Way, Seattle, Washington.

WANT to go in business for yourself without capital? We show you how. Postcard brings details absolutely free. Topval, Lindenhurt 422, New York.

ACME Saw sharpeners are the finest you can own. Don't be satisfied with less. Send for free literature. Max Mfg. Co., 138 Stockton Ave., San Jose 26, California.

READ Idea File—reveals sources profitable mail products. Quarter brings sample-special offer. Gordon, 19628L, Los Angeles 19.

VITAMINS! Terrific Profits! Direct and Mailorder sales to Homes, Offices, Stores and get your own needs Wholesale. Details Free. VimVite, 2908PS Beverly, Los Angeles 57.

FREE Literature! 301 Successful home businesses. Eugene Davis, 759-C Tilden, Flint, Michigan.

MECHANICS-Radiomen! Build unusual sequence timer. Two to fifty circuits. Sell to display builders, department stores, show-window decorators, machine manufacturers. Completely engineered plans $1.00. Box 324, Glen Burnie, Md.

OPERATE Big Paying Business from home, office. Easy, interesting. Make $8.00 profit on every $10.00 order! "Unlimited Possibilities!"—Get Free Details immediately! Smith International, Mount Vernon, New York.

GET U.R. Success folder 25c. F. Banks, 3135 South Logan, Englewood, Colorado.

HUGE Profits from your Jigsaw. 10c brings Valuable Patterns, Illustrated Information. Woodarts, PS-5, Bridgewater, Massachusetts.

EXTRA money addressing mailing postcards. Gui, 2419 Thomas, Chicago 22, Illinois.

EARN $7500 profit in 3½ months. Distribute free advertising premiums from home. Paul Lloyd Company, Box 872, Minneapolis 1, Minn.

HOMEWORKERS Wanted Painting Novelties. Good Earnings. N. Roland, R.R. #1, Vincentown, New Jersey.

ADDRESS Envelopes at Home $50.00 Weekly Possible. National Industries, 33 Hyde Park Avenue, Jamaica Plain 30, Mass.

JEWELRY manufacturing at home without special tools or training. Professional results from the beginning. Make tremendous profits selling to your friends, stores, etc. Great variety of beautiful rhinestone, pearl and moonstone creations to select from. Small investment with all merchandise unconditionally guaranteed. You have started your own business when you send 25c for our fully illustrated catalog and other literature. A. V. Cutt Company, Inc., 210 Fifth Avenue, New York 10, New York.

UNLIMITED chances. "Learn to Invent". Two dollars, guaranteed. Burger, 11592 Gateway, Los Angeles 64, California.

EARN Money evenings, copying and duplicating comic cartoons for advertisers. Adservice, Argyle 2, Wisconsin.

FREE Folio "Up to $45,000; Unlimited Vacations." No merchandise, equipment. Unknown! Work home—sparetime! Haylings—S16, Carlsbad, Calif.

$35 WEEKLY addressing envelopes. Instructions $1, refundable. Adservice, Spring Valley 36, New York.

$1,000 MONTHLY possible raising earthworms! Backyard, garage, basement. Complete illustrated booklet explains raising, feeding, packing, marketing. 25c postpaid! Ozark Worm Farm-V, Willow Springs, Mo.

EXCEPTIONALLY Profitable Home Mailorder Business Plans. Lewis Bartlett, Richland, Georgia.

FREE Book "505 Odd Successful Businesses." Work Home! Expect something Odd! Pacific-35C, Oceanside, Calif.

$13.50 PER Thousand for home addressing. No selling. Details for stamp. H. M. Service, Box 37215-PS, Los Angeles 37.

TYPISTS! Make money at home! Mailers, 2 Madison, Greencastle, Indiana.

AMAZING Mailing Plan Pays you $10.00 per Thousand. Guaranteed. Free Details. Outcalt, 3556 Dodge Street, Omaha, Nebraska.

ADDRESS envelopes at home. $25 weekly possible, sparetime. No selling. Temple Co., Box 946, Muncie 7, Indiana.

"GROW Into The Mail Order Business" Experienced Operator Tells How. Send $1.00 today. Premier, Box 8177, Chattanooga, Tennessee.

IMPORT direct from Japan low-cost, fast-selling merchandise for high profits. Experience unnecessary. Complete, simple, home-business plan which anyone can operate. Airmail $1. Francis Justice Exporters, Akasaka, P. O. Box 7, Tokyo, Japan.

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ALUMINUM Awnings. Sell yourself. Sell neighbors. Factory prices. Write All Weather, Box 10254, Tampa, Florida.

39 FORMULAS, PLANS, ETC.

FORMULAS—All kinds. Latest products. Literature free. Kemico, Park Ridge 15, Ill.

COMMERCIAL Formulas—catalog 10c. George, Chemist, 5150 Wilton Pl., Los Angeles 62, Calif.

READY to get started toward independence? Send for free copy "Formulas for Success." M. G. Vaughan, 304 Arbor Drive, Columbia, South Carolina.

FREE Formula List. Anything analyzed. Northwestern Laboratories, 1708 West Lake, Chicago.

TWENTY Formulas Pleasure or Profit. Send $2.00 to Modern Eras Enterprises, Box 35, New York 60, New York.

ANY Formula $3.00. Catalog—Mfg. Treatise 10c. J. Belfort, 192 North Clark, Chicago 1.

MODERN formulas for today's fastest selling big-profit products. Literature free! Miller, Chemist, 1517-A, Tampa, Florida.

40 PLASTICS

PLASTICS home-craft course for Men and Women. Tells and shows how to make hundreds of fast selling plastics products. All plastics and materials for 23 projects included in course. No special tools needed. Course pays for itself. Write for Free booklet. Interstate Training Service, Dept. D-2-G, Portland 13, Oregon.

LAMINATING Supplies Price List Free. Solomson, 46A Cornhill, Boston 8, Mass.

PLEXIGLAS—Cut to size—Clear—Any thickness — Colors — Rods — Tubing. McClarin Plastics, P. O. Box 168 B, Hanover, Pa.

PLEXIGLAS, Lucite. Square foot cost 1/16"—$1.10, 1/8"—$1.45, 3/16"—$1.80, 1/4"—$2.15, 3/8"—$3.20, 1/2"—$4.35. Colors add 10%. Send 15% for postage. Aristocrat Plastics, 85 Clarkson St., New York City.

FIBERGLAS resins for boat coatings. Vanhorn Plastics, 1905 Ingersoll, Des Moines, Iowa.

PLEXIGLAS, Fiberglas, Polyester, Acetate, Vinylite. Fast service. Wholesale-retail. Catalog—15c. Gem-O'-Lite, Box 6862P, North Hollywood, California.

41 CHEMISTRY & PHYSICS

NEW ides chemical and apparatus outfits for home experimenting. Photo-scales, microscopes, chemicals, biologicals, and laboratory supplies in small quantities. Catalog 25c. Established 1931. John H. Winn, 124B West 23rd St., New York, N.Y.

STRONGEST Glue In The World. Up to 3600 lbs. per sq. in. on wood. Famous since 1879. Always ready to use. Sticks anything stronger. Send 25c coin for Trial Bottle of Famous, Dependable Elwell's Liquid Glue. Dept. 205, Gloucester, Mass.

CHEMISTRY, Biology, Microscopy Catalog, 25c. Laboratory Sales, Box 161-B, Brighton, Massachusetts.

ILLUSTRATED Catalog: Chemistry, mineralogy, biology 20c. Tracey Laboratories, Evanston, Illinois.

AMAZING New Book of Science, Experiments, Formulas and catalogue of Laboratory Supplies. Only 25c. National Scientific Co., Dept. PS-7, 2204 W. North Ave., Chicago 47, Illinois.

CHEMICALS and apparatus for industrial, analytical and private laboratories. Catalog 25c. Dept. M-26, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 20, N.Y.

EXPERIMENTERS Supplies catalog: 20c. Hagenow Laboratories, 2414 Clarks, Manitowoc, Wisconsin.

MAKE extra money. Address, mail postcards. Spare time every week. Write Box 174, Belmont, Mass.

OVERSEAS, Latin American, Alaska, Canada Employment. Originator 1955 "Foreign Service Directory" Up-To-Minute Report on Military & Civilian Construction; Oil Companies, Aviation; Transportation; Steamship; Mining; Government Job Info. How-When-Where to apply. Listing Firms Hiring. $1.00. Global Reports. Box 883-S, Hollywood 28, Calif.

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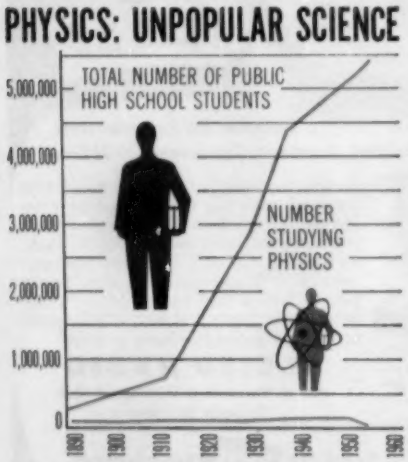
POPULAR SCIENCE MONTHLY'S . . . Last-minute news & notes

CHRYSLER IS NOW OFFERING SEAT BELTS FOR ALL ITS CARS. It is the first manufacturer to take the step long urged by safety experts (PSM, June, p. 126). The belts are extras to be installed by the dealer, and will cost around $50 for the front seat, plus $20 or so for the rear seat. In 1950 Nash offered a single belt for its reclining front seat, but abandoned the idea when it found that 98 percent of the belts were never used...YOU MAY BE SAFER IN AN OLD CAR, according to an investigation by John O. Moore of the Cornell group studying smashups. He found: "When injury-producing accidents occur, occupants of 1950-54 cars are injured more often than occupants of 1940-49 cars. Further, there is a significant increase in the frequency of fatality..."

SEVEN A-SUBS BY 1960 IS THE NAVY'S GOAL. Besides the Nautilus (in use) and the Sea Wolf (abuilding), two more have been partly contracted for and three are proposed for a 1956 start...AN ATOMIC FURNACE WITH BIGGER HOLES IN IT is wanted by the AEC. The holes admit materials for testing.

HIGH-SCHOOL PHYSICS IN THIS ATOMIC AGE hasn't kept pace with enrollments, to the consternation of educators who must train more and more scientists. Only four percent of the 5,700,000 U.S. public high-school students took a physics course in 1952, a drop from 22 percent of the 203,000 in 1890 (see chart). Algebra and geometry, vital to physical sciences, also suffered. Prof. W. C. Kelly, University of Pittsburgh, who gathered these statistics, blames poor teachers, poor courses, poor equipment and poor salesmanship...A SUBWAY IN GREENLAND is planned by the Army. Tunneling 15 miles through ice 25 feet down, it will avoid hazards of surface icecap travel near Thule Air Base. Regular city-type electric trains may be used.



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Reading time: 3 minutes to learn how to

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by Albert Wells

IT ALL STARTED the day I got the bill: $214.36 for an engine overhaul—and I had only 28,000 miles on the car!

I told my troubles to a neighbor—a lubrication engineer—told him how I'd always changed oil every 1500 miles, changed filters every 5,000 miles. His answer floored me.

"You've been wasting your money," he said. "We've spent millions developing oil additives that keep carbon, gum and abrasives from damaging your engine. Your oil costs about 15c more a quart because of those additives. Yet the absorbent filter packs you've been buying actually soak up oil additives. And the more often you change filter packs, the more money it costs you."

"But don't I need a filter to take the impurities out of the oil?" I asked.

He took a deep breath. "This will really shock you. Engine damage is done by abrasives 10 to 40 microns in size (a micron is .000039"). Your oil filter can't take them out because absorbent material can't be packed tight enough without stopping oil flow when the fibers soak up oil and expand."

"What kind of oil filter do you recommend, then?"

He laughed. "Well, there's a porous bronze filter they're using in supersonic aircraft that does a perfect job. But you can't get one like that for your car."

I asked myself: "Why not?" Next day, I tracked down the outfit that was making the filters for aircraft, and got the answer. These porous bronze filters were made by fusing together millions of tiny bronze balls. Non-absorbent, they didn't remove additives, yet they removed abrasives in the 10-to-40 micron danger zone. Could they be made for automobiles? Again the answer floored me.

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Test models had already been used in cars and trucks for millions of miles, proving the porous bronze filter: 1. Never needs replacing. 2. Saves the quart of oil thrown away with ordinary filter packs. 3. Increases engine life.

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For complete unit, including case (fits any car), send make, year and model of your car and $12.95 (we pay shipping).

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Ship ☐ complete unit for _____
make, model, year of car
☐ conversion kit for _____
make and number of present filter

I enclose ☐ $12.95 for complete unit ($18.95—chrome)
☐ $6.95 for conversion kit (full-flow, $13.95)
☐ $2.00 deposit; send C.O.D.

Name _____
Address _____
City _____ Zone _____ State _____

To the millions of motorists who insist on

5-RIB CHAMPION SPARK PLUGS

for best engine performance

HERE'S MORE PROOF OF YOUR GOOD JUDGMENT!

NASCAR DAYTONA BEACH GRAND NATIONAL stock car race permits only regular stock spark plugs to be used—the kind available at neighborhood dealers. Once again, Champion scored a clean sweep! The first nine cars to finish—Chryslers, Oldsmobiles and Buicks—were all Champion-equipped!

Start of the Daytona 160-mile race. Tim Flock (R.Front) and Lee Petty (L.Front) finished 1-2 in Champion-equipped Chrysler 300's.

THE FLORIDA INTERNATIONAL GRAND PRIX OF ENDURANCE—Sebring's AAA-sanctioned, 12-hour race for sports cars—was won this year by Phil Walters and Mike Hawthorn in a Champion-equipped Type D Jaguar. They finished 25 seconds ahead of a Ferrari driven by Phil Hill and Carroll Shelby. The Ferrari, also running on Champions, was first on Index of Performance.

The winning Jaguar (19), owned by Briggs Cunningham and fitted with Champions, roars into an early lead from the LeMans type start.

Better by far for every car, regardless of make or year!

5-RIB

CHAMPION

SPARK PLUGS

POPULAR SCIENCE
Monthly

Atomic Ruins Reveal Survival Secrets

By Wesley S. Griswold

DOOM TOWN, NEV., appeared to die in an instant one cool morning this spring. The blinding atomic flame from the test explosion Operation Cue—less than a mile away—silhouetted the desert hamlet in a false dawn. A blast wave thundered across it to echo off the Nevada mountains and pummel observers stationed many miles away.

As the true dawn came, smoke and dust enveloped Doom Town like a shroud.

But Doom Town only appeared to die. It had been built by the Federal Civil Defense Administration, other Government agencies and many private industries to brave the searing winds of nuclear fission for the sake of us all. How it

WHAT HAPPENED TO A FRAME HOUSE

This basementless ranch house was crushed by the blast—except for the bathroom, which was shielded by reinforced concrete walls.

BRICK-CINDER BLOCK

Standard masonry house—cinder block and brick—was reduced to rubble. But occupants might have survived in the simple basement shelter which was left almost intact.

PRECAST CONCRETE

Earthquake-proof house of reinforced concrete slabs—identical to homes many Californians now live in—was barely scratched. The interior was almost a total wreck, however.

WEIRD NEW SHED STOOD UP BEST

Three industrial buildings—the kind you see everywhere housing machine shops and warehouses—were exposed side-by-side to the A-blast. Two were wrecked. The third, amazing nearly everyone but its designers, was scarcely hurt. This was the strange-looking Behlen building (center in photo at right). It was made of sheet-steel panels, doubly corrugated and bolted together, with no framework and only a conventional foundation.

stood its unearthly shock was to show how we might survive atomic attack.

Some readers may wonder if it were not unrealistic to test the damage effects of a 30-35-kiloton nuclear weapon on dwellings in a world that already has thermonuclear weapons with at least 1,000 times this one's explosive power. It was not.

Kind of damage is the same. The zone of severest damage from a hydrogen bomb extends an appalling distance farther from Ground Zero than that of a plutonium bomb, but the *kind* of damage that occurs is roughly the same. Therefore the smaller bomb's explosion told the experts a great deal that would hold true for an atomic explosion of any size.

When the dust cloud lifted last May and radioactivity dwindled, those who had seen fiery disaster strike Doom Town discovered to their surprise that the disaster was by no means total.

A two-story house of bricks and cinder blocks on Doomsday Drive, 4,700 feet from the exploding bomb, was a heap of rubble. But a simple wooden shelter in one front corner of its basement stood undamaged. Could people have survived there? Two dogs did. They were friendly and showed no signs of injury seven hours after the bomb went off.

Refuge in bathroom. The house next door, a one-story frame rambler without a basement, was also a shocking ruin. Except the bathroom. This room had been walled with steel-reinforced concrete, eight inches thick. It had a double door and a window shutter, each made of two layers of plywood, glued and screwed together.

The bathroom shelter, estimated to cost about $500 at East Coast prices, was intact. One pane in the window was broken. That was the only damage.

How would residents of this house have fared in that refuge? Two dogs made out fine—no injuries, no complaints.

Nearby, two single-story, basementless houses not only remained standing but seemed to have no structural injuries. How did that happen, in this zone of critical damage?

They were not trick houses. They had been built from stock plans that meet California regulations for earthquake-resistant homes. Houses anyone could buy.

Both were reinforced concrete. One had precast wall panels, reinforced by ⅝-inch steel rods. The other had walls of eight-inch concrete blocks reinforced by half-inch rods. The overhanging, flat roofs of both homes were precast concrete

DEEP WAVES ARE SECRET of Behlen buildings' strength. Combining small corrugations with 7½" wave makes panel 1,000 times stronger than flat one would be. Building that survived A-blast was 16-gauge galvanized steel, but other weights of steel and aluminum are made.

NO FRAMEWORK is needed for buildings as wide as 60 feet. Bolts join wall and roof panels into rigid arches, nearly as strong as I beams, so that the shell supports all weight. Steel beam connecting roof panels at ridge is visible in above view of interior end gable.

slabs, eight feet wide, six inches deep.

The concrete in both houses was made with a lightweight, expanded-shale aggregate. Expanded shale is a kind of stone popcorn, created by subjecting ordinary shale to high temperatures. The pieces of shale expand into porous but very strong pebbles. Mixed with cement, expanded shale forms a highly resilient concrete that weighs 90 pounds per cubic foot, in contrast to concrete made with sand-and-gravel, which weighs 150 pounds.

The wall panels of the precast concrete-slab house contained embedded steel plates, exposed at the wall edge. When the house was erected, those plates were welded together at the top, center and

BABY MANNEQUIN, under a lean-to basement shelter a mile from Ground Zero, was photographed by automatic camera at instant bomb burst. "Baby" survived unharmed, still standing.

bottom of each wall end. The roof panels were fastened together in much the same way. The roof was then bolted to protruding vertical reinforcing bars in the walls, and cone-shaped openings around the bolts were filled with concrete.

The walls were erected on concrete piers capped with steel base plates. Leveling devices threaded into the bottoms of the panels were welded to the base plates and the space around was filled with concrete. The floor was poured after the walls were set up. The window and door frames were steel, cast as part of the wall panels.

The walls of the concrete-block house were reinforced vertically every 32 inches with half-inch steel bars encased in concrete and horizontally with bars of the same size at the centers and tops of the walls. Window and door spaces were similarly reinforced at the sides.

The continuous concrete footing for this reinforced masonry-block house was poured at the same time as the floor. Steel dowels were set in the footing at 32-inch intervals. They stuck up into four-inch-square cells in the walls. The cells were then filled with concrete.

Solidly built, these houses, and stout indeed they proved to be. The builders, a group of five firms banded together for this particular test, were frankly worried beforehand about the overhanging roofs, which they thought might behave like sails under the slamming force of the bomb's pressure wave. They did not.

Three modest chips were gouged from the face of the precast house, where the front wall met the roof. Two courses of concrete blocks beneath the living-room window of the reinforced masonry-block house had been shoved inward an inch or two. The roof slabs were sprung a tiny bit at the seams. But both houses could quickly have been made habitable again.

Mannequins lolling in these houses at the time of the blast were torn to pieces. Window sash, except for one, had bent but held. The glass, transformed into thousands of lethal slivers, had been hurled through the house with hurricane force. Draperies were in shreds.

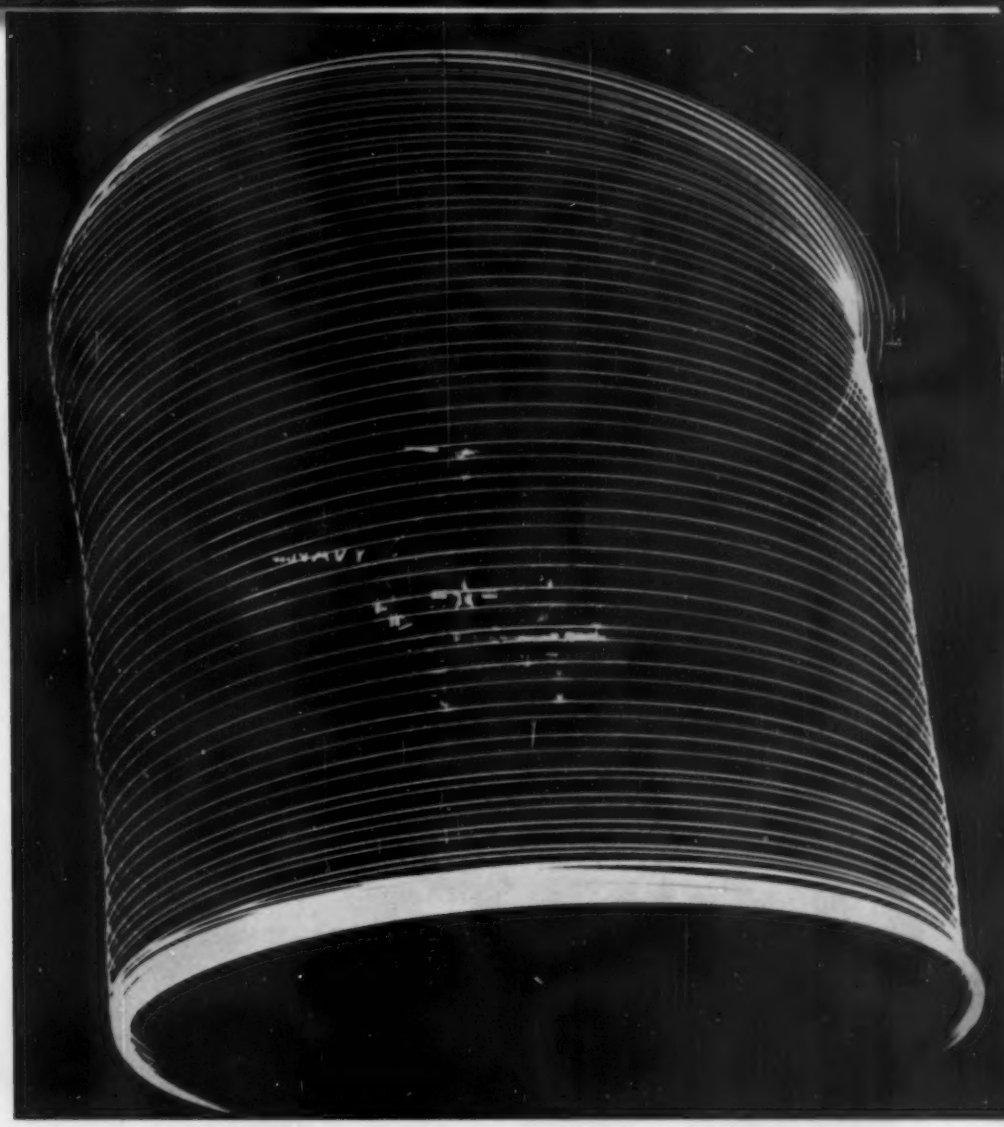
But the kitchen appliances in the precast house were still usable. Radio-transmitting equipment and a telephone switchboard that had been set up in the masonry-block house were reported unhurt.

Could humans have lived in the cosmic wind that swept through those houses, despite the fact that the structures stood fast? Nobody can say for certain, but it seems highly probable, if there had been shelters for them to retreat to. Without shelters, the residents would undoubtedly have been slaughtered by their own window panes, metal Venetian blinds, ash trays, book ends and other small, homey furnishings, fired at them as if from a cannon in the living-room window.

The test unexpectedly highlighted the value of the humble metal window screen as a shield—when it is mounted on the *inside* of the window. Screens in a first row of trailers, a mile farther from Ground Zero than these two houses, almost without exception warded off shattered window glass and dumped it on the ground—although the pressure wave bowled over two trailers standing broadside.

Slightly more than a mile from Ground Zero stood the blackened walls and part of the roof of a two-story white frame house. It had been specially strengthened to see if its new design would withstand the bomb's force better

[*Continued on page 216*]



Gay Blades on Helicopter Paint an Unusual Night Picture

BLADE-TIP helicopter lights, able to withstand centrifugal forces up to 1,000 times their weight, made the spiral design above. Westinghouse and Kaman Aircraft cooperated to develop the lamps, which are important in nighttime copter identification.

Copter Pulls Wires for Linemen

THE helicopter at right saved Santa Ana, Calif., telephone men a week's work. The job: stringing lines over 2½ miles of rough San Diego range. Solution: a copter strung manila rope, as much as 2,000 feet at a time, over the crossarms of poles, while a ground crew used the rope to pull the six wires from pole to pole.

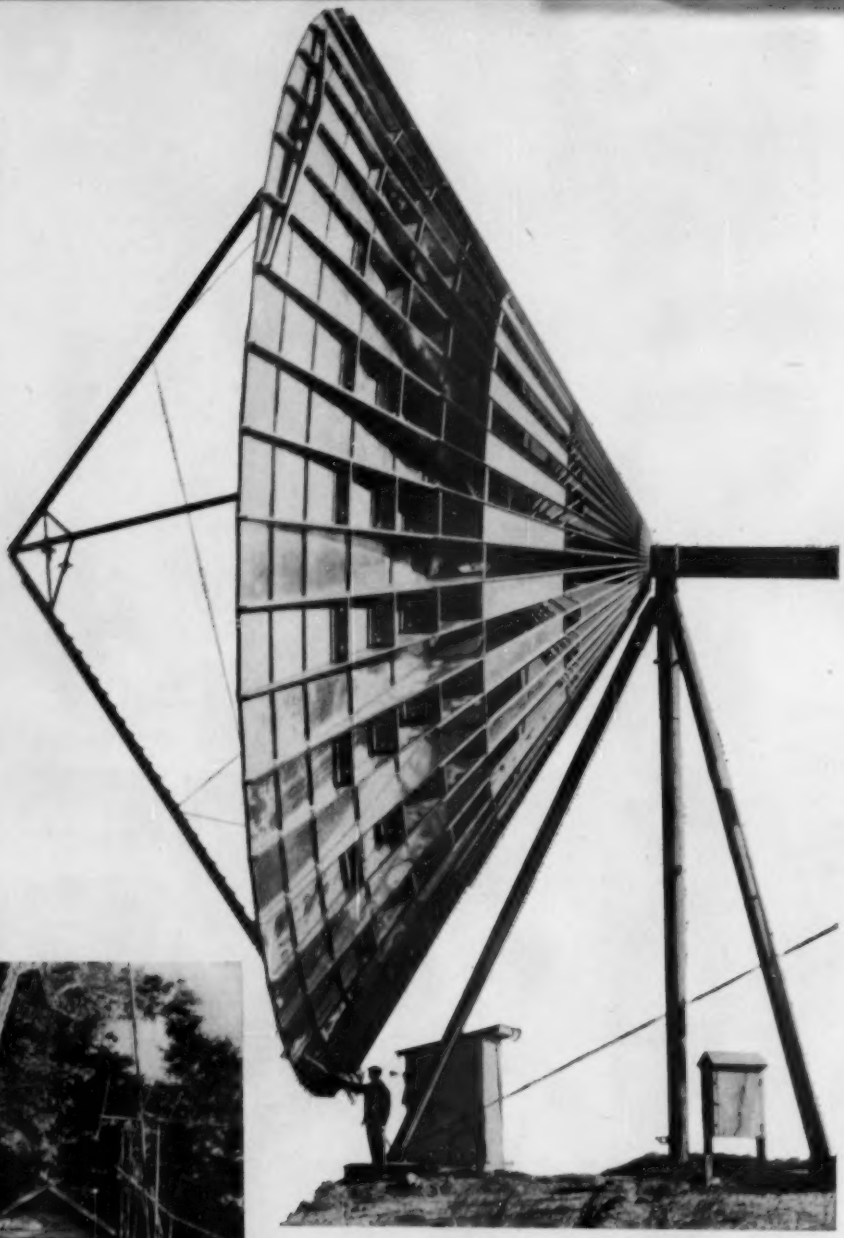
A ramp within a ramp forms the core of San Francisco's newest parking center. The down ramp winds like a spiral staircase around a central pylon, and the up ramp winds around the down ramp. The slope is so gentle that any car—even an ancient model—can climb to the top level in high gear. Each of the 11 floors holds about 90 cars.

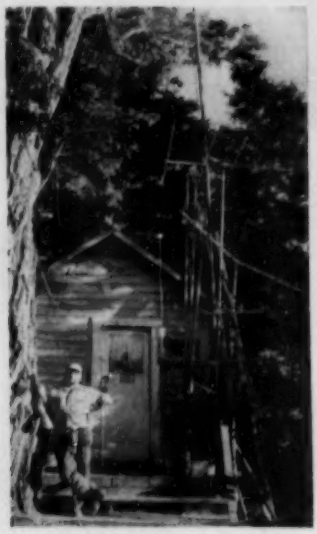
Traffic Troubles . . . *and how some people beat 'em*

Strangers can't get lost in downtown Detroit. A push-button information board lights a tiny lamp on a map to point out the right spot to catch any bus or streetcar.

Ferris-wheel parking stacks 10 cars in the space usually occupied by two. The inventor, P. J. Scott, Jackson, Miss., figures three men could operate towers to park 300 cars.

Riding their motorbike, Patrolman Johann Mueller and his police dog, Astor, help keep traffic moving in Hamburg, Germany. Mueller built the special sidecar for his four-legged teammate when his bicycle was motorized and the dog could no longer keep up with him on foot. Now they're a mighty fast-moving, efficient team.





TV Relays: Big One and Little One

BOTH of these structures were made to do the same job: pass the picture along. The 60-foot giant above, largest super-high-frequency antenna in the world, stands at Bell Labs' Holmdel, N. J., site. Its range: 200 miles. At left is the TV relay station of Hayfork, Calif., built on a nearby mountain top. Its generator runs for six hours on a gallon of gasoline. Whenever the town's three sets are to be turned on, somebody jeeps up and fills the gas tank.

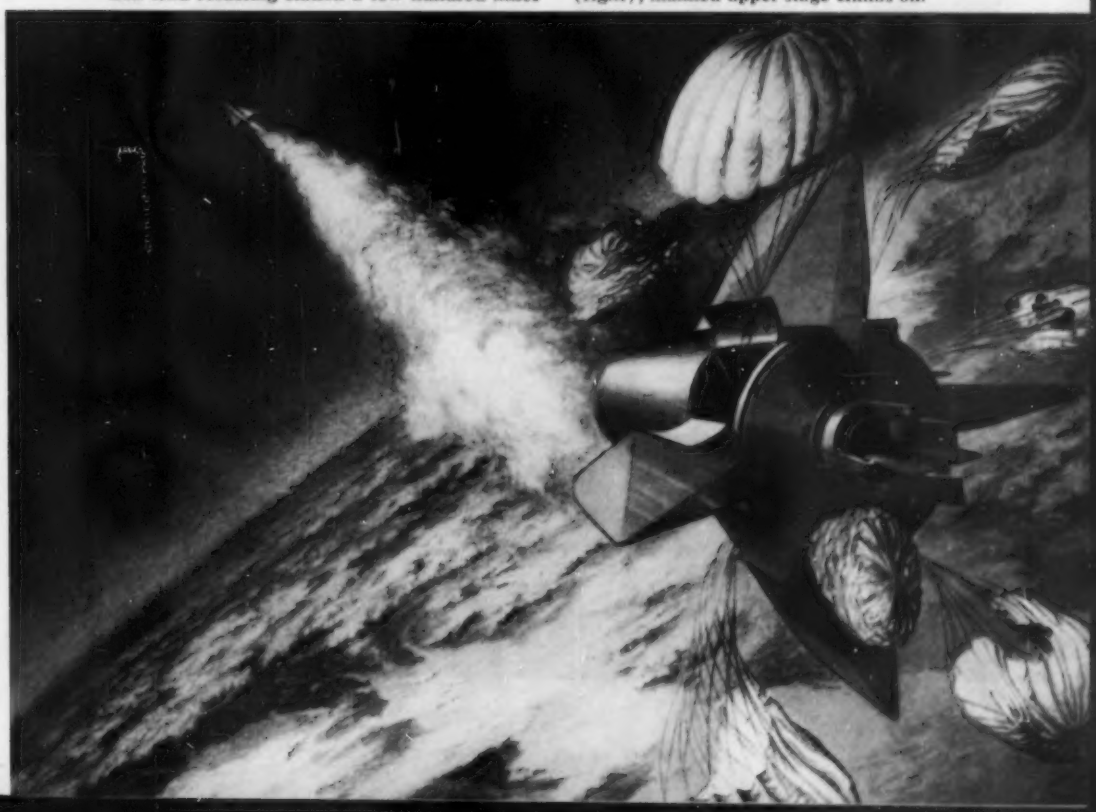
SPACE-STATION SERVICEMAN for moon-bound ships floats free of gravity. To get about, he squirts gas jet. Spacesuit has oxygen supply and radio, with direction-finder loop.

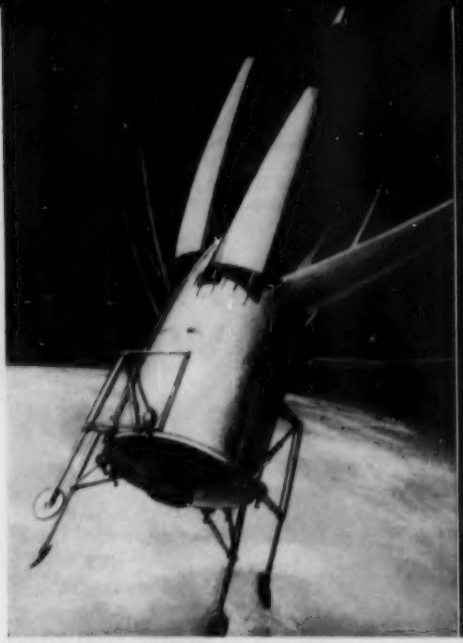
Rocket Experts Show How We Can Live on the Moon

SPACE adventurers can reach the airless moon, survive its rigors and set up permanent colonies there. So predicts Ralph A. Smith, English rocket expert and artist, whose drawings on this and the next two pages show how they'll do it. The views are from a series of 45 in a new pictorial book, *The Exploration of the Moon,* published in this country by Harper & Brothers, New York. Its accompanying text is contributed by Arthur C. Clarke, noted British writer on interplanetary flight.

Pioneer settlers on the moon face a forbidding world. Water to drink and, at first, even oxygen to breathe must come by spacelift. But future lunar colonies with atomic power and air-purifying plants may make such early hardships a memory, the artist and writer think.

TWO-STAGE ROCKETS like this one would set up and tend refueling station a few hundred miles above earth. Lower stage, fuel spent, drops off (right); manned upper stage climbs on.



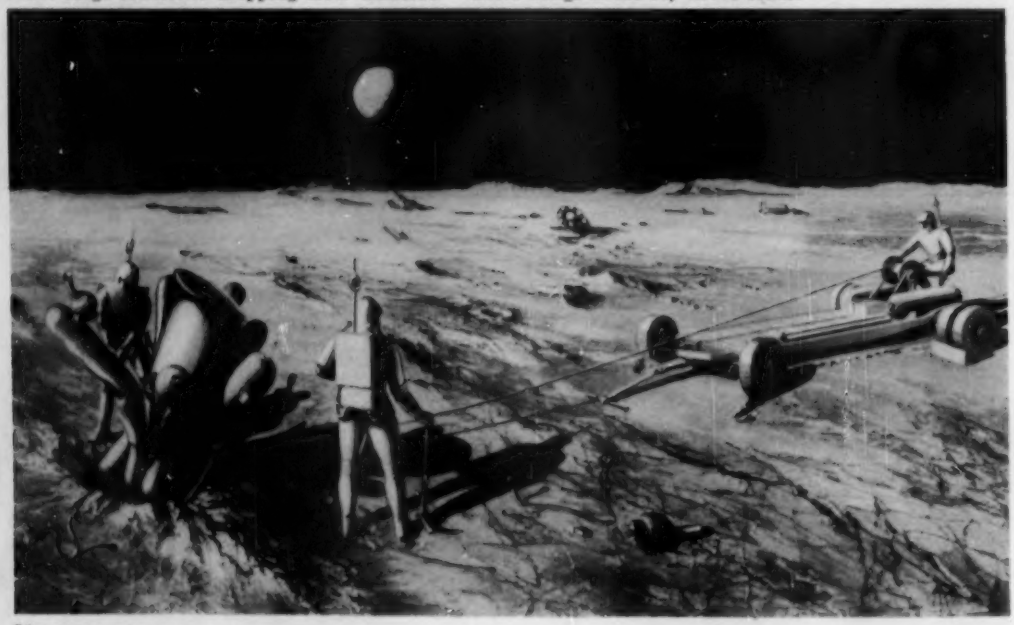


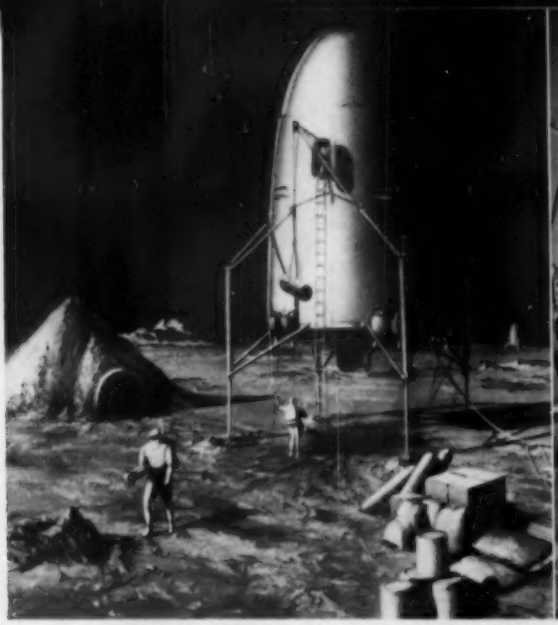
EARTH-TO-MOON ROCKET, having dropped two of three stages, shucks streamlining with small explosive charges. It will never re-enter air, but shuttle between moon and space station.

LANDING ON MOON climaxes last leg of journey, after refueling stop at space station. Ship's crew uses rockets to brake descent and to correct tilt. Flexible landing gear takes impact.

First a landing on the moon, then pioneer

SUPPLIES DROP TO EXPLORERS, who require constant spacelift of food, water and oxygen. By radio control, piloted spaceships guide fleets of robot cargo rockets to dropping area. Battered but intact bundles surround a robot, left, that has made rough landing. Tractor retrieving supplies is powered by turbine using rocket fuel. Earth hangs in the sky above scene.





MOON EXPLORERS pitch camp. Inflated plastic spheres with airlocks serve as living quarters. Heap of rock dust covers one, at left, for protection against extremes of heat and cold.

HOME ON THE MOON: inside a plastic sphere. Scientist at microscope is studying mineral specimens. Behind him, radioman talks with distant earth. Cylinder on ceiling holds oxygen.

bases—and perhaps, some day, lunar cities?

PIONEER SETTLERS' EQUIPMENT includes solar-powered generators; radio mast, an inflated rubber tube; and sledge, easy to haul, since things weigh only one-sixth as much as on earth.

ROCK DOMES enclose spacious, atomic-powered lunar city of more distant future. Algae farms in tubes renew air, augment food supply. Overhead railway links moon colonies. END

Giant Crane Cracks an Egg

"TO MAKE an omelet," starts an old recipe, "you first break the eggs." Here is one way to do it: Take 96,000 pounds of mobile crane and back it up to a 40-ton airplane. Attach the hook of the crane's hoist to the plane and lift the aircraft several feet off the ground. Place an egg under one of the plane wheels. Now, using an electronic remote-control box (as shown in photo below), gently lower the 40 tons of plane until the tire just touches the egg, cracking, not squashing it.

This stunt, pulled recently by the Navy at Floyd Bennett Field, Brooklyn, N.Y., had a purpose. It was to demonstrate that, although its huge new MB-1 mobile crane is powerful enough to pick up and walk away with the heaviest Navy four-engine combat plane, it still has hairline precision controls on the hoisting mechanism to prevent damage while handling costly aircraft.

The 48-ton giant crane, designed and built by the LeTourneau-Westinghouse Co., in cooperation with the Navy's Bureau of Aeronautics, will be used at U. S. Naval Air Stations all over the world for aircraft servicing, repair and salvage. It has a 325-horsepower diesel engine. Electric motors, however, control both steering of the vehicle and operation of the crane.

The remote-control box is necessary since the driver's cab is from 30 to 60 feet from the crane hook, depending on the position of the boom.

ATOMIC JEEP: It Searches for the New Pay Dirt

JUST about every device that will help locate uranium is in Texan Francis K. Campbell's 4,300-pound jeep. Among them are a scintillator counter, reciprocal direction finder, two-way radio, fluoroscope, microscope, chemical-assay kit, Geiger counter with probe, and a special device (at Campbell's right) that keeps a continuous record of radiation on a graph. A companion jeep, equipped to do the drilling, follows behind.

ATOMIC SIGN: Triangle Warns of "Hot Spot"

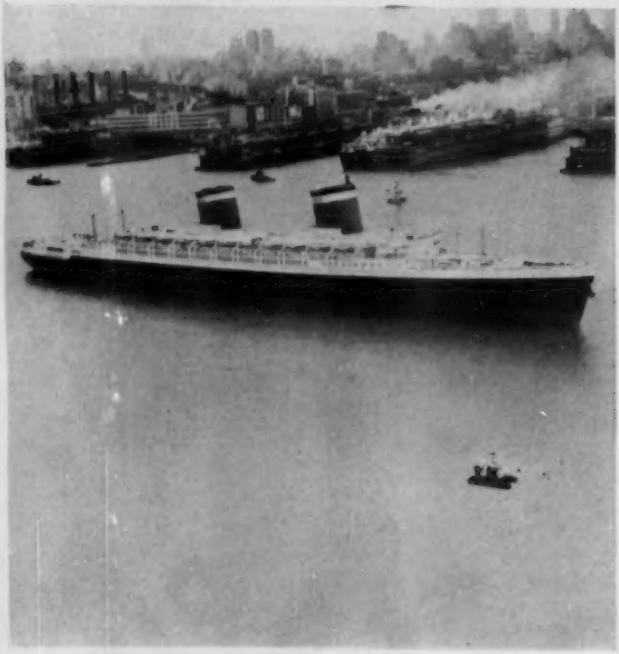
STANDARD markers for designating areas contaminated with radioactivity have been agreed upon by the armies of the United States, Great Britain and Canada. Just as minefields are marked off, present-day armies will tag radioactive "hot spots." The marker, triangular in shape, will have the word "Atom" printed on it as on the sign at left. The back surface will bear data such as radiation intensities and dates.

ATOMIC STORE: Sells Everything but an A-Bomb

AN "ATOMICS" STORE selling everything for the twentieth-century atomic man is the newest sign of the times. Universal Atomics, 19 E. 48th Street, New York, orients the potential prospector through its "Prospecting Information Service," then sells him the equipment that he will need in the field. Specialty: a gun-type transistor Geiger counter that operates with flashlight cells.

New Wide-Angle Camera Catches 126

Photos copyright, 1955, by New York Herald Tribune, Inc.



A NEW camera with what is claimed to be a revolutionary wide-angle lens snapped the magnificent panoramic view of New York City spread across these pages.

The camera, invented by Luis Azarraga and named by him "Camerama," takes action pictures at a previously undreamed of angle width: 160 degrees. In the photo above, Azarraga caught the 990-foot liner *United States* with an enormous piece of real estate behind and beyond it: New York from 138th Street down to Greenwich Village.

Other inventors who have taken a crack at the same problem ran into snags: When they got a

CONVENTIONAL PHOTOGRAPH shows the *United States* and a small slice of Manhattan. In foreground is helicopter with Azarraga aboard. At shorter range, he got panorama above.

Blocks of New York City's Skyline

lens wide enough, it was too slow. Or it was fast but not wide enough. Or the pictures came out hopelessly distorted.

The field of vision of an ordinary camera is about half that of Azarraga's. News cameras take in 40 to 45 degrees—a quarter of Camerama's sweep.

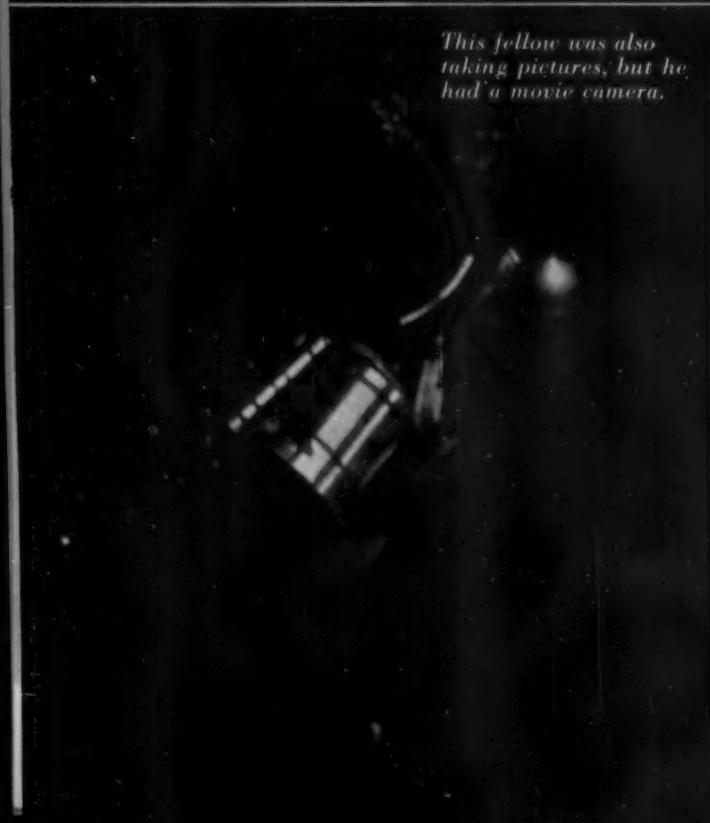
The new camera, coupling a fast lens with unusual width, can catch a race horse with all four feet in the air, and at the same time take in the entire race track. Or it can snap a batter in mid-swing, while showing the whole ball park.

Azarraga's secret? It's sealed in the aluminum "breadbox" wrapped around his camera.

CAMERAMA INVENTOR Luis Azarraga usually mounts camera on 17-foot tripod to get his best shots. Born in the Philippines, he came to U.S. in 1914, has worked as a photographer since.

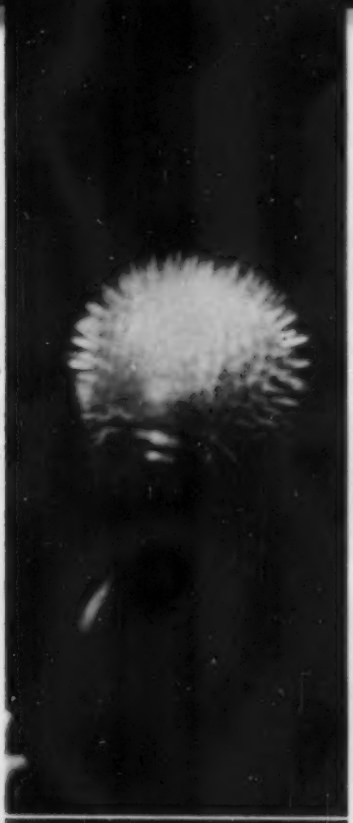
I snapped this guy heading up with a sea bass he'd speared.

Another diver tickled a porcupine fish to make it puff up for me.



This fellow was also taking pictures, but he had a movie camera.

Here's a new twist—a deep-sea archery contest with spear guns.



How to Enjoy Skin Diving

An expert who mastered the sport at 42 tells of the thrills to be had under water, hunting with both spear gun and camera.

By Homer J. Lockwood
as told to Wesley S. Griswold

I SPEND as much time as possible under water. Every weekend, the whole year long, and every vacation I go skin diving.

I'm 46, the father of three children, and a plant superintendent in Los Angeles. Most people would feel, I suppose, that a man of my age might better play golf and cards. They'd say, "Skin diving is for kids."

Skin diving is the most fascinating sport I've ever tried, and I took it up only four years ago. The main requirements are a healthy body, a sound heart, and a willingness to endure a little discomfort for a lot of recreation.

ON THE WAY HOME from Catalina, I often wear my faceplate and snorkel for comfort in the flying spray.

I've been barked at and nuzzled by playful seals that could have broken me in two if they'd felt like it. I've been bitten by an octopus (my own darn fault). And I've been towed through deep water like a bunch of kelp by a wildly thrashing 92-pound fish I had speared.

But I keep on. The sport is safe if you obey a few simple rules and keep your head.

I used to be an eager rod-and-reel fisherman. But it's lots more fun to go down where the fish are. This way, I can hunt for the kind I want, stalk it and, if I'm lucky,

EDITOR'S NOTE: The author of this article is president of the California Council of Diving Clubs, representing 40 organized clubs in a state that is reported to have 100,000 skin-diving enthusiasts. He is well qualified to describe the pleasures of this new sport and give advice for making it safe fun.

spear it. It's a great deal more exciting than catching whatever happens to strike your hook.

For years, photography has also been a hobby of mine. Now I've adapted that to the sea. I built myself a waterproof camera case of Lucite and mounted an exposure meter inside it and a depth gauge on the outside. I have two Leicas with interchangeable lenses. I keep one loaded with black-and-white film, the other with color. When I'm out for undersea pictures, I take them both along, one bolted inside the transparent case, the other lying handy in my boat or pack. There is a tremendous amount of pleasure in taking pictures of the strange and beautiful sights found under water.

Outboard boating is another hobby of mine. I own a 16-foot Burchcraft—plywood hull covered by glass cloth—with an Evinrude 25 motor. I named it *Chapulin* (Mexican slang for "grasshopper"). I've logged 4,000 miles on the ocean in this combination, including a 250-mile crossing of the treacherous Gulf of California with my partner, Chuck Peterson. I don't think anybody else has done that in an outboard.

Nearly every Saturday or Sunday I set out early in the morning with a fellow diver in my *Chapulin* for Catalina. The waters off this island are clearer and contain more marine life than those off the California mainland. It's a 20-mile run from San Pedro harbor to Catalina. Sometimes we make the trip in dense fog, sometimes in a stiff head wind that drenches us with spray the whole way. We always check for storm signals, though, and stay close to shore if they are hoisted.

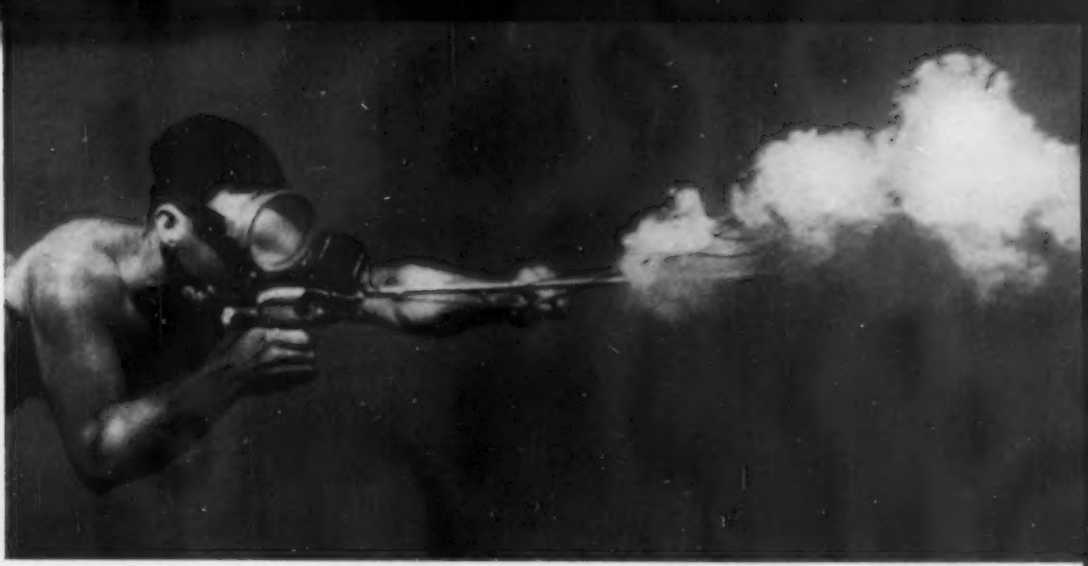
In midwinter, when the temperature of the sea, even off Southern California, gets down to a blood-chilling 50 degrees, I wear two woolen sweaters and ankle-length drawers under the rubber suit. I wear another sweater over the suit, but that's to protect it from being cut on rocks, not to keep me warmer.

Under these circumstances I think skin diving is improperly named. I prefer to call it sport diving, since skin doesn't play

Firing a gas-powered spear gun scares the fish.

MY PARTNER, CHUCK PETERSON, usually takes underwater pictures with a 16-mm. movie camera. It's in this homemade case of stainless steel and glass. His light meter is separate.

Climbing out of the surf is a tricky business.



I prefer the rubber-powered kind. But I can't complain. This made a dramatic picture for me.

A NIGHT DIVING ADVENTURE was beginning as I took a flashlight picture of this girl entering the surf. She's carrying a pressureproof flashlight and is going to hunt for lobsters.

That tire tube is invaluable to a skin diver.

CHUCK TOOK THIS ONE OF ME in a garden of kelp off Catalina. Right at this spot, the water was very clear. Sometimes, unexpectedly, it gets so cloudy you can hardly see two feet.

much part in it for a lot of us, who wear rubber suits even in summer.

When we arrive in the calm water of any one of Catalina's numerous small bays, I toss out the anchor and prepare to go overboard. That means putting on a faceplate and snorkel, a weight belt (about five pounds of lead) to overcome normal buoyancy, and slipping rubber fins over my feet. These fins, or flippers, vastly increase a swimmer's speed and free his hands to handle a spear or camera.

GETTING SET FOR A DIVE, I am checking one of my cameras. Weight belt and fins are in the foreground.

If I'm out for seafood, I carry a rubber-powered spear gun. Though not as deadly as the gas-powered kind, it has a 120-pound thrust, which is packing plenty of push to kill fish weighing up to 100 pounds.

If I'm looking for pictures, I select the camera I want and seal it in the waterproof case.

I always take along an inflated rubber tube and, if possible, a companion. Those are safety rules of fundamental importance. Your companion is there to keep watch while you dive, and take his turn diving while you stand guard.

If you get hurt, if your equipment fails, if you work too hard and become exhausted, you must have a resting place near at hand. The inflated tube provides this. You leave it floating on the surface while you dive. It never drifts very far in the two minutes—at most—you are likely to be below.

"Two minutes?" you ask. "What fun can you possibly have in two minutes?"

It does seem incredibly brief. But if you're an experienced rifleman, on a range you can fire 25 carefully aimed shots at a target in the space of two minutes!

At sea, in two minutes, I can descend 30 feet, focus my camera on an interesting subject, take four pictures and return to the surface. Or I can locate, pursue and catch a 15-pound lobster. Or spot, stalk and spear a fine fish.

Actually you are in the water two or three hours, much of it below surface.

Once I was taking underwater pictures of a seal. I had to laugh about it after-

[Continued on page 220]

Skin-Diving Safety Rules

1. **Have a float with you at all times.** It can be an inflated inner tube, a one-man life raft or an inflatable preserver.

2. **Never dive alone.** Take a buddy along to watch while you are diving, and then you watch while he dives.

3. **Know your physical limitations.** Don't let yourself get overly cold or tired.

4. **Never dive when you have a cold.** If you have sinus trouble, asthma, a heart condition or punctured eardrums, you should never dive at all. Leave it to your friends.

5. **Plan in advance** what you will do in an emergency.

6. **Look up when surfacing.** It's easy to come up under a ledge or a boat, bang your head and perhaps knock yourself out.

7. **Take special care** entering or leaving the surf. This is to avoid being tumbled on the rocks, ripping your suit or losing part of your gear.

8. **Be sure that your weight belt** has a quick-release catch, workable with one hand. Sometimes you may need to jettison that belt in a real hurry in order to rise to the surface.

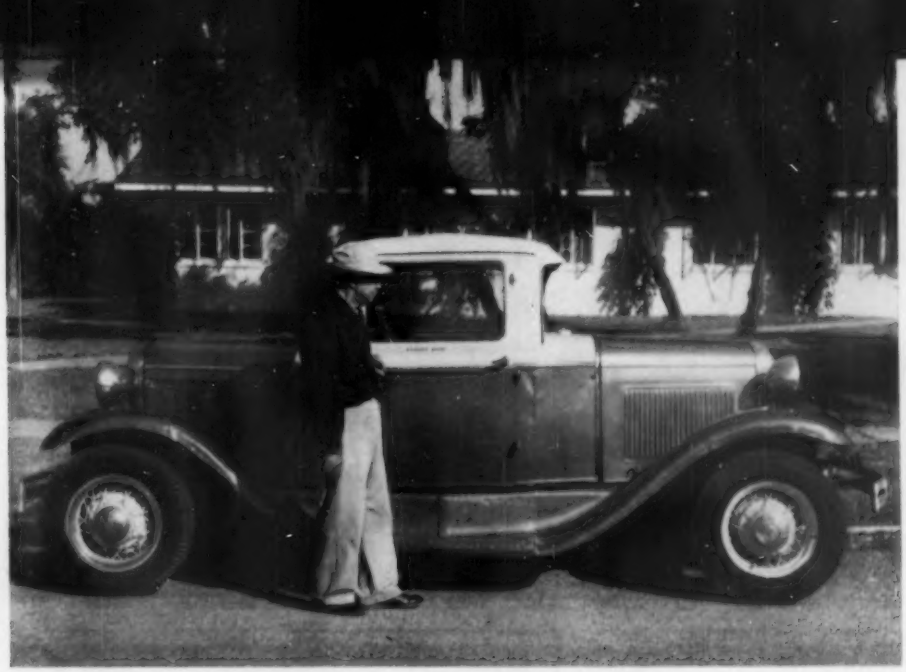
9. **Never carry a loaded spear gun** above the surface. It's as dangerous as a loaded rifle.

10. **If you have a gas-powered spear gun,** remove the shaft when out of water.

11. **Cover the tops of all spear guns** with cork, rubber or cloth when you are out of water.

12. **Don't go after game** heavier than your equipment can handle. To spear fish likely to weigh more than 40 pounds, you *must* have a 50-foot safety line on your gun.

13. **Never attempt to dive** with an underwater breathing unit (diving lung) until you have first become thoroughly proficient in all phases of skin diving.



Two-Headed Model A Ford Looks the Same Coming or Going

ART student Weyland Moore of Sarasota, Fla., worked up this fore-and-aft Model A just for the fun of confusing people who see him drive by. It has two radiators (one non-working), two sets of headlights, and even dual hinges and door handles. Double windshields round out the weird effect. The spare tire is under the rear "hood."

Plush Packard Caribbean Adds Comfort to Sports-Car Styling

THIS 275-hp. luxury job with the wrap-around parking lights is the new Packard Caribbean. You won't see many around—Packard is limiting its production of the '55s to less than 1,000 "editions."

The Carib blends sports-car styling with sedan comfort, its makers say. Packard's torsion-bar suspension and load levelizer, introduced this year, will ease the car over bumps, while power brakes, power steering, power windows, power antennas (mounted on the rear fenders) and power seats help you to conserve your energy. The price: just a shade under $6,000.

Mast on Airborne Radar Lab Pokes 15-Foot Finger into Sky

To SPOT the Navy's new flying radar lab, watch for what looks like a conning tower or smokestack. Actually, what pokes above the fuselage is a 15-foot mast that can be raised and lowered in flight. Four radar sets are mounted under the plane's wing and four consoles are set up in the cabin. The mast houses meteorological instruments.

Private Jet Plane Will Do 405 M.P.H.

HERE'S a preview of the first propless private plane, the French M-S 760. A four-place job with a pressurized cabin, it will fly nearly 1,000 miles nonstop. Its twin jets will give it a cruising speed of 350 miles an hour and a top speed of 405. Beechcraft will sell it in North America.

They Say Now .....

F. B. LEE, U. S. ADMINISTRATOR OF CIVIL AERONAUTICS: *"Aviation is such a dynamic industry that you have to be a vigorous optimist to avoid getting caught with your planes down."*

H. J. MULLER, ZOOLOGIST, INDIANA UNIVERSITY: *"[Seen from] the universe of stars, not only all human beings but the totality of life is merely a fancy kind of rust, afflicting the surfaces of certain lukewarm minor planets."*

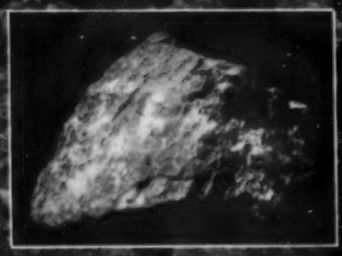
DEAN RUSK, PRESIDENT, ROCKEFELLER FOUNDATION: *"If a little knowledge is a dangerous thing, the remedy is to advance further into the unknown . . . not to retreat into enforced ignorance."*

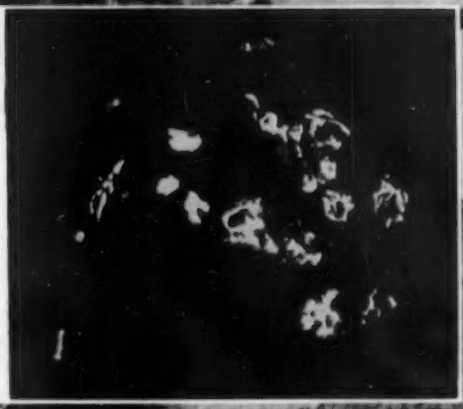
FIELD MARSHAL VISCOUNT MONTGOMERY: *"Absolute defense against air attack will be impossible in the future."*

CARL J. OXFORD JR., NATIONAL TWIST DRILL & TOOL CO.: *"The production of holes in manufactured parts is probably the most important single manufacturing operation."*

By rays from black-light lamps, they're

Finding Uranium in the Dark





Telltale glow leads prospector to atomic ore

Night prospector seeks uranium with ultraviolet lamp. Insets show why. By daylight (above) dull-gray Wyoming rock looks unpromising. But in dark under lamp (right) vivid spots of color glow from same rock, and reveal that it contains a uranium mineral, schroeckingerite.

RUNDBERG URANIUM MINE in Nevada was discovered with ultraviolet lamp. Now, owners use lamp to sort ore into high-grade and low-grade piles, seen just outside mine entrance.

By Sterling Gleason

NIGHT prospectors, working under the stars with short-wave ultraviolet lamps, are finding uranium that daytime hunters have overlooked.

One recent afternoon in a Western canyon, as two prospectors worked their

ABANDONED MINES and prospect holes make good hunting grounds for black-light prospecting. Where other metals have been found, chances of turning up uranium are bettered.

"PANNING" HELPS JUDGE amount of fluorescent ore in rock. Prospector puts pulverized sample of rock in gold pan, and stirs it under rays of ultraviolet lamp as shown above.

way over shattered rock to the base of a cliff, their Geiger counter went crazy. There was uranium nearby and plenty of it, but where? Underfoot? Along the forbidding rock face? Or deep inside the granite mountain? Everywhere the rock looked alike; everywhere, the Geiger ticked madly.

The two men had no mind to trek three miles back to their cars, loaded down with hundreds of pounds of samples for assay. Very likely the vein itself was not exposed. Meanwhile someone else might come along, and by lucky chance erect his claim monuments on the right spot, snatching away the prize.

Seeing in the dark. The prospectors knew just what to do. They made camp, cooked dinner, and awaited nightfall. As soon as it was dark, they began flashing the dim purplish beams of their ultraviolet torches over the rock. Their eyes caught a faint gleam on the face of the cliff, barely within reach. A network of tiny streaks glowed yellowish-green.

Clambering higher, they broke away the surface rock with a pick, and the glow spread. The cavity was aflame with ghostly radiance. A chunk of the rock stirred the Geiger to a torrent of clicks. They had found the vein.

By dawn, it had led them as far up the cliff as they could gain a foothold. It grew richer as they probed deeper. After breakfast they erected rock cairns to mark the boundaries of their claim, posted location notices, tagged sample bags and noted where each sample had been taken.

A few days later their assayer had good news for them. He identified the find as autunite, an important uranium ore that is beginning to figure prominently in night prospecting.

The stampede is on. Because of such discoveries, the big uranium rush is taking a new turn. Sears, Roebuck and Montgomery Ward are both adding portable, battery-powered ultraviolet mineral lamps to this summer's mail-order catalogs. Mining-supply and mineral dealers have long been selling them to professional prospectors, who already know their value in locating uranium and other minerals. Now thousands of amateur uranium hunters will extend the search to new territory.

To encourage the hunt, the Atomic Energy Commission is offering fat bonuses. A uranium strike may bring an award of up to $35,000, depending on the quality and quantity of the ore. The winner gets it in the form of extra payments for ore that comes from a new mine. And this is in addition to the excellent price that the AEC guarantees he will be paid for all uranium ore of good milling grade. A lucky prospector can win a new bonus each time he makes a new strike. More than 500 uranium miners already have claimed a total of $5,000,000 in bonuses.

The Government is anxious to develop

TYPICAL LAMP OUTFIT tucks batteries and hand lamp, on cord, into metal carrying case. Put a rock in dark chamber below lamp, and strong fluorescence can be seen even in daytime.

AT "PICKING TABLE" ore coming up from this mine passes beneath ultraviolet lamp. Pieces that fail to glow are discarded, so that only good-quality ore will be shipped to the mill.

new uranium fields, outside such intensively explored "hot spots" as the carnotite deposits of the Colorado Plateau. And its prizes, lately paid out at the rate of nearly $200,000 monthly, have been effective in extending activity to new U.S. areas. Uranium stampedes have resulted in South Dakota, Washington, Montana, Texas and in previously unsearched parts of New Mexico, Arizona, Nevada and California.

A mother and son bought a short-wave ultraviolet lamp, read up on mineral prospecting, and recently spent evenings roaming the hills north of the historic mining city of Tonopah, Nev. It was the mother, Mrs. Rose Walters, who first spotted uranium—particles of ore glowing yellowish-green in the dark. The news spread and, within a month, hundreds of claims were staked.

At another Nevada site, near Austin, exploring a formation known as a fault, Joe and Rudy Rundberg found seams in granite speckled with yellow grains resembling coarse gold. They took samples to a veteran mining man, Fred Vollmar, who put them under an ultraviolet lamp. The flecks glowed apple-green. A Geiger counter strengthened Vollmar's suspicion that they were autunite.

With pick and dynamite the two Rundbergs, father and son, drove a tunnel 89 feet through solid granite to intercept what Vollmar thought would prove a major vein. The next shot broke into uranium ore that radiated a brilliant green under the ultraviolet lamp. The Geiger counter beat a pleasant tattoo.

Since that moment, the new mine's owners test every fragment from a blast under the lamp. Brightest-glowing pieces go to the high-grade stockpile, duller ones to the low-grade pile. No time is wasted handling barren rock.

All do not glow. Not all of the more than 100 known uranium minerals have the peculiar property of glowing under black light. Tom Warren, whose Ultra-Violet Products, Inc., of San Gabriel, Calif., is a pioneer manufacturer of this apparatus for mining use, counts only a score of this kind in his collection of fluorescent rocks, said to be the world's largest. But he predicts that the 20-odd fluorescent uranium minerals, some extremely rare at present, may help track down huge new stores of nuclear ore.

"The fluorescent uranium minerals," Warren explains, "are secondary compounds produced when primary uranium is broken down by weather or other natural forces. Some have been carried along by great geological upheavals. Most are readily dissolved and carried off by underground water. Finally they may wind up on some sunny ledge, or in seams in the rock, where the water evaporates and deposits the uranium salts. Showings like these are being picked up by night prospectors in many areas.

"If you run across them, don't get too

excited. Probably you've found a trace, not a commercial deposit. But the important thing is that you have a hot clue.

"Your job now is to follow it back to the primary deposit. This may take a lot of work and it may pay off big, or not at all—but that's prospector's luck."

Primary uranium minerals, of which the most important are pitchblende and uraninite, don't fluoresce. By daylight these minerals look dull black or brown.

Fluorescent uranium minerals, like schroeckingerite from Wyoming, troegerite from the Green River area of Utah, and widely distributed autunite, are among the secondary ones. They generally are brightly colored in daylight—green, yellow, orange—but may be inconspicuously scattered through other rock in tiny crystals. In the dark under a lamp, most of these glow yellowish-green; some, a more pronounced green or yellow. A few fluoresce only when the specimens are from certain localities; elsewhere, the same mineral fails to glow.

PROSPECTOR MARKS SPOT where minerals glowed in dark. But for stake with white cloth streamer, it would be lost in daylight, when rocks look alike.

The textbooks say that carnotite, one of the country's most important uranium ores, doesn't fluoresce at all. Recently prospectors have learned a trick that isn't in the books. They remove the deep-purple filter of the lamp, and let the raw ultraviolet light shine on the rock. Then carnotite *does* fluoresce, in glowing yellow spots, like a rash of measles. This is an exception to the usual rule that the filter, by screening out most visible light, helps to observe fluorescence.

If you're black-light prospecting in U. S. mountains or deserts, most often a mineral that responds to your lamp will glow greenish-yellow. This could mean uranium; it could also mean chalcedony, hyalite opal, calcite, or any of a number of less valuable minerals. But the Geiger will instantly settle the question of whether the specimen is radioactive; lamp and counter make good teammates.

Do fluorescence and radioactivity add up to uranium? Not invariably—but a remarkably sensitive and conclusive test can be made by a prospector in the field:

You powder a little of the rock, mix it with calcium fluoride, pick up a little in a platinum-wire loop, and fuse it into a bead in a small, hot flame. If there's uranium in the rock—even as little as one part in 10 million—the bead will glow a brilliant green or lemon-yellow under your ultraviolet lamp. The materials, including a small alcohol lamp, can be obtained from any chemical supply house.

Magic eye. Miners have yearned for magic spectacles to see the mineral treasures in rock—and now, for some ores, the wish has come true. Lamp in hand, they can see minerals outlined in living fire, and place dynamite so accurately that each shot opens a new ore face exactly on the vein.

Near Leander, Wyo., the Sateco Uranium Co. sent a sample truckload of ore from a new-found deposit to the mill. Assays had been encouraging, and the miners had checked every chunk loaded with a Geiger counter. But the mill reported the ore "barely commercial."

The miners soon found why. Above their vein lay highly radioactive but worthless rock. It looked just like the rest, and fooled the Geiger counter too. But only good ore would fluoresce.

From then on, they worked only at night, guided by the lamp. Hand-cut trenches exposed the uranium vein, a glowing yellow-green band. Now only fluorescent ore goes to the mill. END

Lightweight Cycle Goes 100 Miles On Gallon of Gas

ONE-LUNG ENGINE with only 125-cc. displacement has needle bearings at top of connecting rod, roller bearings on crankpin. An airplane-type magneto-generator supplies juice for ignition and lighting.

FOR a bit more than $2 a pound you can own this American bantamweight motorcycle. A little beefier than European two-cycle jobs, it weighs in at 174 pounds, costs $355. Harley-Davidson calls it the Hummer.

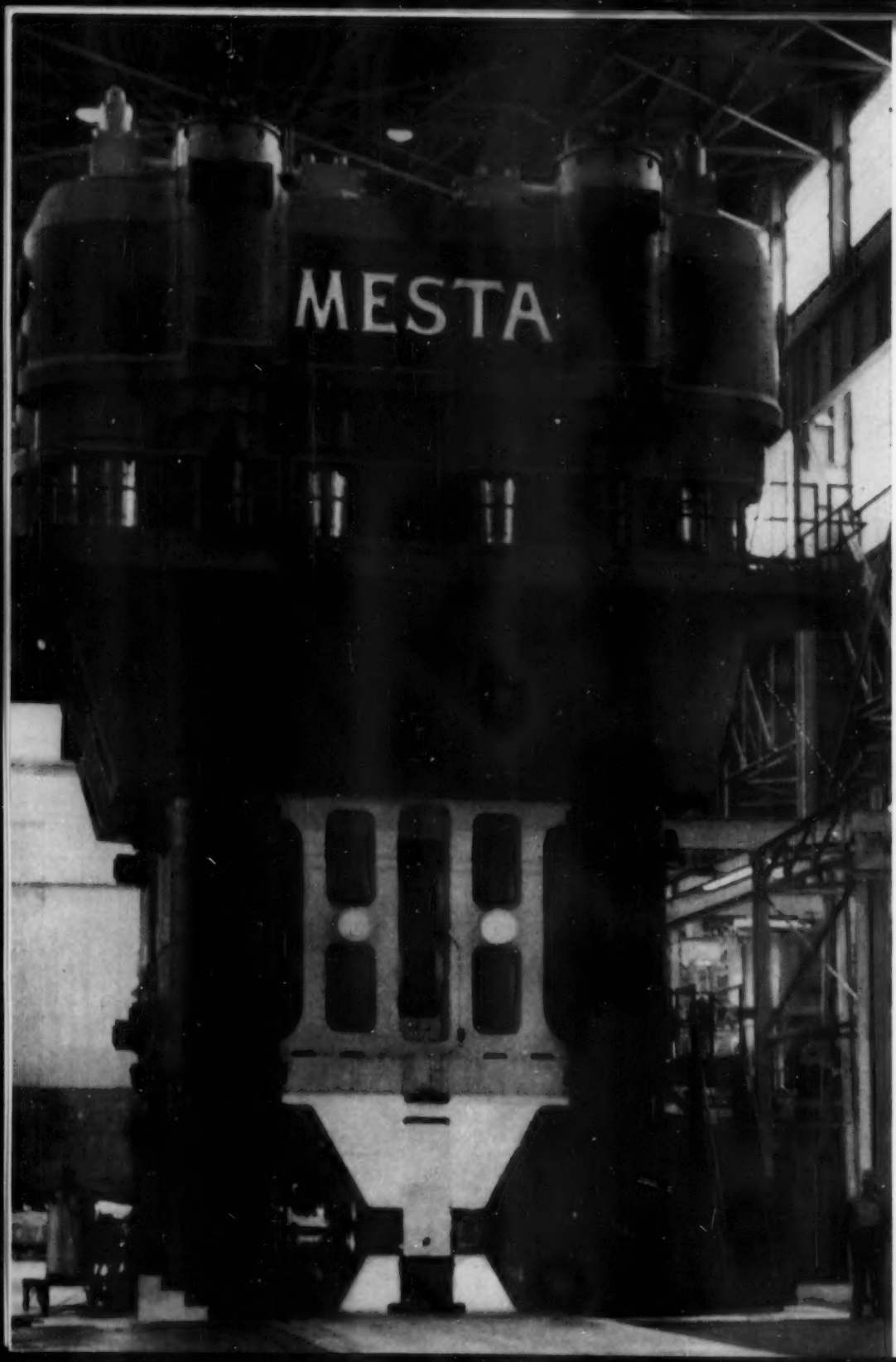
A magneto-generator hybrid on the main shaft of the two-cycle engine eliminates any need for a battery. One winding feeds high voltage to the spark plug, another gives with low voltage for the head- and tail-lights. A real fuel miser, the Hummer can wheel past 200 miles of landscape with a full gas tank of just under two gallons.

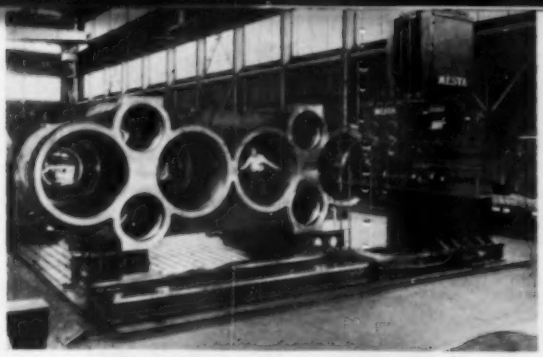
New Car Puts Mom in the Pink

PINK is for girls. And that's what you mostly find in the interior of Dodge's La Femme, a new model made just for the ladies. Cases on the back of each front seat hold a fitted handbag (above), and a raincoat, boots and umbrella. All pink, natch.

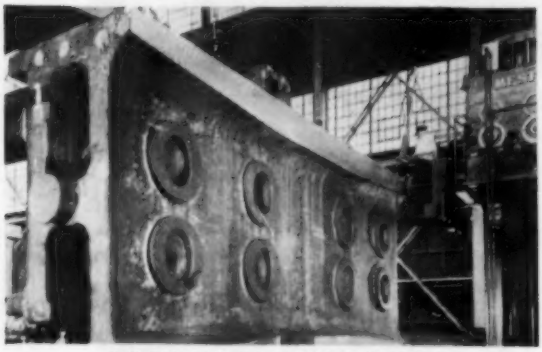
Now They're Gilding the Caddy

THE gold-plated Cadillac above turned up at an auto show at the Cross County Center, Yonkers, N. Y. Hand-built in Italy, the $30,000 car has a low-slung body wrapped around a standard Caddy chassis and motor. Two New Yorkers own it.

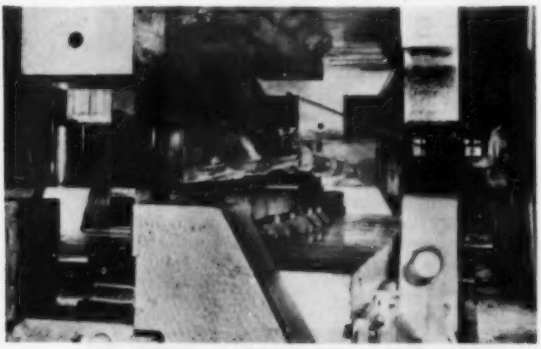

MESTA



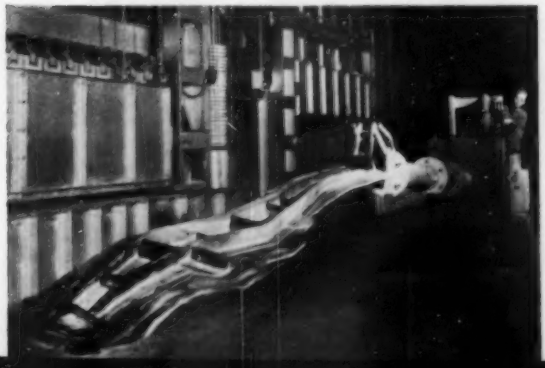
PRESSURE CYLINDERS OF THE PRESS are so big that an inspector stood inside a port to check its diameter during construction.



CLOSE TO 600,000 POUNDS of steel were poured to make this upper die-holding section of the Mesta press. Here it is shown being milled.



A SQUEEZED AIRPLANE WING SPAR is removed from the press bed (above) and hauled away by a special manipulator truck (below).



Giant Jaws

Shape Bigger Parts for Better Planes

EVERYTHING is big about the Air Force's newest hydraulic forging press.

• Its giant jaws squeeze five-ton aluminum alloy ingots into complex shapes with a pressure of 50,000 tons, equal to the weight of a battleship.

• It is the most powerful in the U.S., most likely in the world, unless Russia has built one larger than the 33,000-tonner removed from Germany after the war.

• Monster steel precision dies that weigh up to 100 tons fit into a bed big enough to park four passenger cars. They are brought to the press by a 200-ton overhead crane so large and so high that its operator reaches his air-conditioned cab by a private elevator.

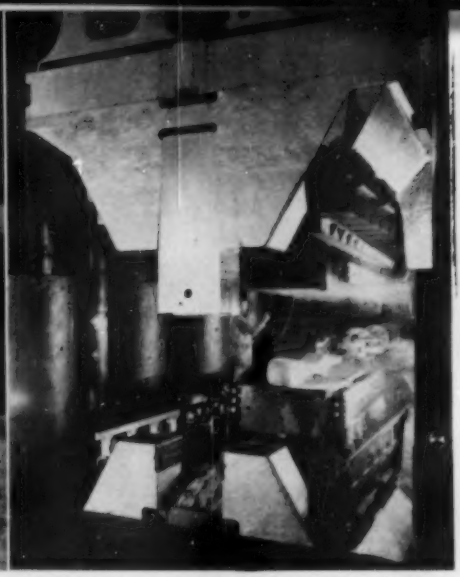
• The press stands 87 feet high, 36 feet of it below ground, and weighs 8,000 tons. It contains enough steel to lay 42 miles of railroad track. Atop its 76-foot-tall columns are threaded eight nuts that weigh 111,000 pounds apiece.

• It can turn out larger and more complicated structural members for jet aircraft than were ever before possible, and make them both stronger and lighter.

The huge machine, built by the Mesta Machine Co., is housed in a new $40,000,000 plant at Cleveland, Ohio, operated by the Aluminum Company of America as part of the Air Force's heavy press program. On the same floor it has a new partner, a 35,000-ton press designed by the United Engineering and Foundry Co.

Another 35,000-tonner, built by the Loewy Construction Co., went into oper-

AFTER A FORGING LEAVES THE PRESS, its dimensions are checked with oversize calipers. One advantage of the big presses is that they do a precision job, eliminating machining.



READY FOR A 50,000-TON SQUEEZE, this 800-degree-hot mass of aluminum has been roughly preshaped on a smaller press. Smoke above is from oil being sprayed on hot upper die.

ation last March in an Air Force plant at North Grafton, Mass., being run by Wyman-Gordon. And late this summer a second 50,000-tonner, also designed and built by Loewy, is expected to start producing forgings at North Grafton.

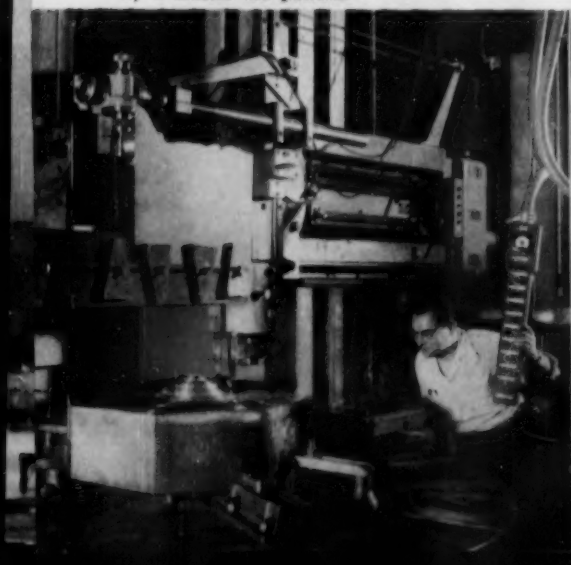
An example of what these heavy presses can squeeze out is a 12-foot-long aluminum wing spar for the Convair F-102 delta-wing, supersonic interceptor. Using conventional methods, the four spars in each plane would require 272 parts and 3,200 rivets to hold them together.

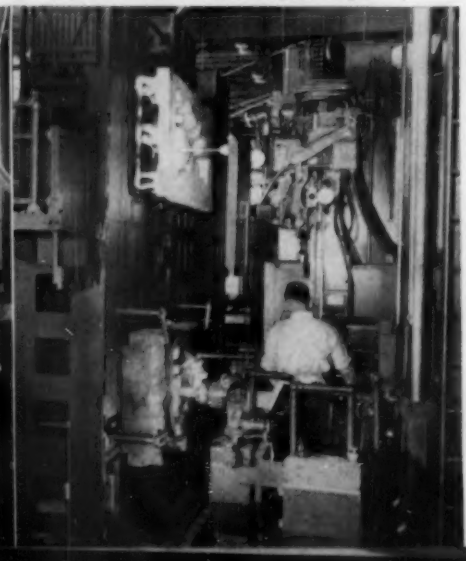
The job these presses can do for military jet planes can also be done for peacetime industry—especially in the transportation field: commercial planes, trains, trucks and buses.

Already the Air Force is studying designs for a super-monster 100,000-ton press that could come mighty close to squeezing out whole airplane wings in one piece.—*Herbert O. Johansen.*

PRECISION OF THE HEAVY PRESSES depends on the accuracy of the dies. Here an 84-inch vertical boring mill, cutting in steel, is controlled by a master die pattern.

METAL FINGER tracing contours in a plaster model (upper part of photo) guides the cutter of this machine in making matching impressions in a steel die block (lower part of photo).





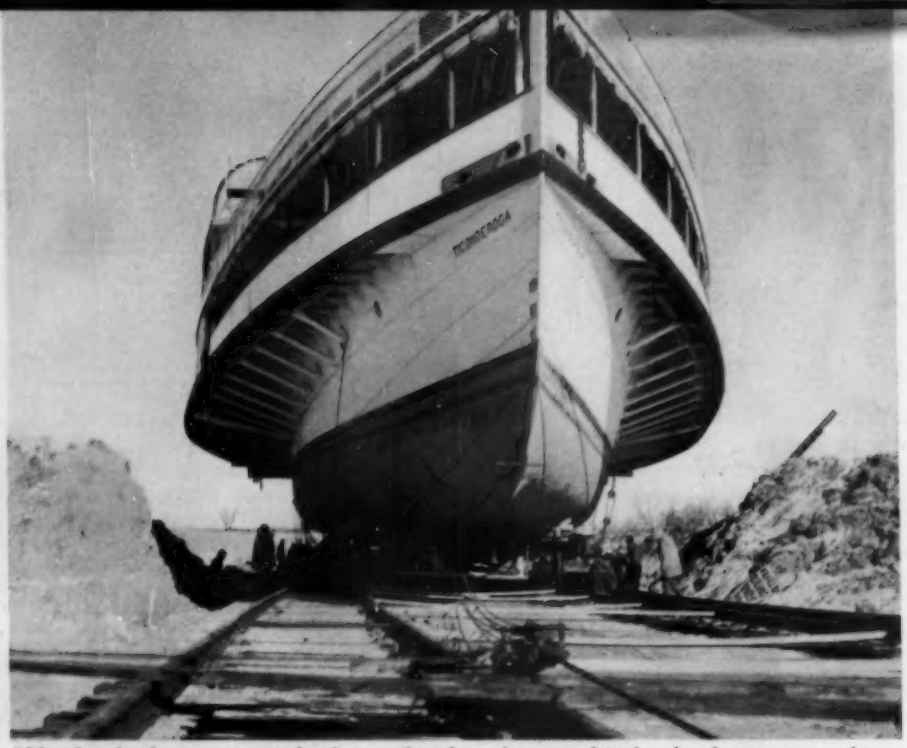
It's in the bag, now, but when Charles Bordeaux gets all the pieces out, there'll be a 13-foot canoe on this French dock. Three rigid parts fit into a collapsible skin to form a one-man kayak. Portage is no problem. After a day on the Seine, the inventor stuffs his craft into the duffel bag and slings the 37 pounds over his back.

Gadgets and Gear for the Sportsman

Camera stock steadies a 35-mm. German camera while you aim it like a rifle and pull a trigger to shoot. With the "butt" against your shoulder and a nosepiece bracing the upper framework, you see each scene full size instead of peering through a small finder. Ditto Camera Corp., 551 Fifth Ave., NYC, sells camera and holder.

A battery without a case powers this lantern. Actually, two six-volt batteries sealed in steel form a unified power pack that is its own case. There are no contacts, no wires to hook up, to connect the battery. When the twin light head is attached with screw caps, its metal frame completes the circuit. Burgess Battery Co., Freeport, Ill., makes the Radar-Lite.

Water, water everywhere and not a drop fit to drink? Here's a featherweight plastic purifier you can carry in a shirt pocket to do a job on lake or stream water. The Hin-Lon Co., 147 Chelsea St., Hawthorne, N. Y., says it kills bacteria and removes any swampy taste or odor.



Old side-wheeler moves overland on railroad tracks toward its last berth on museum lawn.

How to Ship a Boat by Rail

THIS side-wheeler is making its last journey—a two-mile portage from Lake Champlain to a high-and-dry anchorage at the Shelburne Museum in Vermont.

To beach the 49-year-old *Ticonderoga*, Merritt-Chapman & Scott salvagers dredged a basin deep into the shore line. A 14-foot dike was then built around the basin and 200 feet of adjoining land on which double tracks were laid. By controlled pumping, the ship was floated onto a cradle mounted on railroad trucks. When the dike was breached, the "Ti" was all set for its two-month dry run. Each time the ship moves forward a few hundred feet, the track is picked up from behind and relaid ahead.

LANDLOCKED, 892-ton *Ticonderoga* floats in its beaching basin, surrounded by 14-foot clay dike. Raising water level put "Ti" above its cradle; pumping out set vessel down on it.

LAST CRUISE for the venerable 220-foot excursion boat is down a pair of railroad tracks, pulled by truck and winch. Double tracks were required because of the vessel's bulk.

The World's Best-Known Mechanic

THIRTY years ago this month a gruff, gray-haired mechanic appeared feet-first on the pages of POPULAR SCIENCE MONTHLY. His name was Gus Wilson, and his feet were protruding from beneath a car on which he was "examining the brake rods."

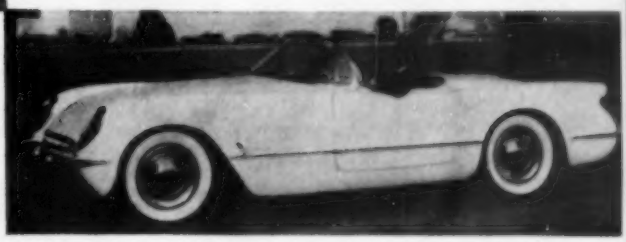
Sliding out on his creeper, Gus Wilson emerged both into the light of day and into an extraordinary career. In the years that followed he has become the best-known and most respected auto mechanic in the world.

All dimensions of the Gus Wilson saga are of heroic proportions. The Model Garage stories are among the longest continuous fiction features ever to appear in any magazine; more than 350 Gus Wilson stories have been published.

Gus Wilson's activities have mirrored the changing U. S. automobile. Back in the Twenties Gus was doctoring the ills of the valiant Model T and its contemporaries. In the Thirties, cars were rolling into Gus's clinic with problems about synchro-mesh, safety glass, and free wheeling. Since the war he has coped with sports cars and automatic transmissions.

To celebrate the ageless mechanic's thirtieth anniversary in PSM's pages, we are presenting this special section. To see what's happening this month at the Garage, turn to the next page. For an informal biography of Gus Wilson, see page 86.

COMMON AS FRECKLES, Model Ts were pouring off the production line when Gus opened his garage.



KEEPING UP with the newest has never been a problem for Gus. He's expert at tuning a hot engine.

Even as he worked, Gus sensed the excitement in the air. This was a challenge. The

Gus Turns Back

The proprietor of the Model Garage thought that he was going fishing. Instead, he found himself on the spot—trouble-shooting a car while the whole town watched.

"IN PRECISELY one hour," Gus Wilson announced, "I'm going to take the day off."

He and Stan Hicks were opening the Model Garage. Gus hadn't the faintest inkling that something was in the wind. For him it was simply eight in the morning of a July day that promised to be just right for sitting on a shady river bank.

Besides, it was the Fourth of July.

"We have the mayor's car to tune," Stan reminded him, almost too quickly.

Gus knocked the ashes from his pipe as he entered the cool interior. "One

mayor's car checked out fine mechanically—except that it stubbornly refused to start up.

the Clock

By Martin Bunn

hundred and seventy-nine years ago today," he said, "our forefathers declared their independence of a tyrant king. I intend to celebrate by declaring my independence of a tyrant mayor." His eyes twinkled as he observed Stan's worried expression.

"But, Gus," the latter protested, "the mayor made a big point of wanting it done this morning. And we agreed."

"*You* agreed," Gus reminded him. "And the only thing," he continued with mock gruffness, "that puzzles me more than the mayor wanting his car tuned on the Fourth of July is your willingness to do it."

STAN looked down and shuffled his feet. Had Gus a suspicious nature he would have suspected, right then, that Stan was up to something. But Gus, though shrewd, never suspected friends of trickery.

"Besides," he went on, "you can handle

From the Pontiac Motor Division collection of old-car emblems

the job. No need for me to hang around."

A look of alarm suffused Stan's face. "But, Gus, I—er—might find something really wrong and need you to give me a hand with it."

This time Gus looked at his assistant sharply. "Since when have you voluntarily admitted that you weren't the world's No. 1 mechanical genius?" Just then the phone rang, and to Stan's relief, Gus went to the office to answer it.

In a minute he was back. "That was Jerry Corcoran, with whom I have an engagement to go fishing." Stan paused in the process of donning his coveralls.

"N-not this morning," he quavered.

Gus was oblivious to his assistant's odd behavior. He answered, simply, "Apparently not." His voice reflected his disappointment. "Now he tells me that he can't get off until noon." Misreading the look of satisfaction on Stan's face, Gus continued, "But I'm not going to do any work. In fact," he exclaimed, "I'm going to spend the morning doing something I've been wanting to do for months. I'm going to clean out the storage room." He turned on his heel and was gone.

A CHEER BROKE OUT and someone hollered for a speech as Gus accepted the plaque (see facing page).

Gus's storage room is a small space off his stock room in which he puts things he can't bear to throw away—used automobile parts, bills, and correspondence. It had become increasingly evident that more space was needed. The oldest of the bills and records must go, Gus had resolved.

He set to with a will and began hauling boxes out into the stock room. He was dragging a particularly big, dust-covered one when the twine with which it was wrapped broke and the contents spilled to the floor. Gus stooped to pick them up and his eye lighted on the top sheet of a neatly wrapped bundle. It was dated July, 1944, made out to Mr. Griggs, the director of the First National Bank. A new muffler. Gus sat down on one of the cartons and stared at the bill, a slow smile playing around his mouth.

It was funny how that piece of paper took him back. He filled his pipe and almost chuckled out loud as he recalled the expression on the crusty old banker's face when he learned that a new muffler would cure his brake trouble. Mr. Griggs had brought his car to the Model Garage because he couldn't get the brakes to work without pumping. Gus had gone all over the whole hydraulic system without finding anything wrong. Then he had noticed a tiny hole in the muffler right beside the tubing that carried brake fluid. He had reasoned correctly that the heat escaping from this hole was vaporizing the fluid, causing the soft pedal.

Gus began thumbing through the old bills. His resolve to tidy up the storage room was forgotten.

HIS reveries were interrupted by the appearance of a harassed-looking Stan Hicks. "Gus," he blurted, "there's a —er—fellow out front whose car won't start. But everything checks okay. What do you think I should do?"

Gus sighed. "I'll go and take a look."

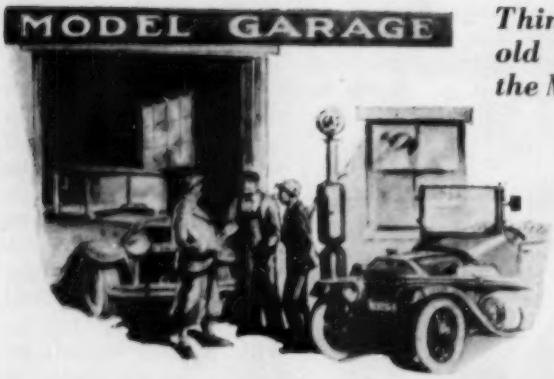
"No!" cried Stan. "You stay right here. This is your day of rest. I'll take care of it. Just tell me what to do."

What is the matter with the lad, today? Gus thought to himself. *He's certainly flustered about something.* But he was enjoying his ramble through the past so much that he decided to let him have his

[Continued on page 192]

These are the emblems on Gus's plaque—once the proud insignia of cars now vanished from the passing parade. Do they bring others to mind?

The Life and Times of Gus Wilson



Things were different in the old days. But the spirit of the Model Garage is timeless.

By Frank Rowsome Jr.

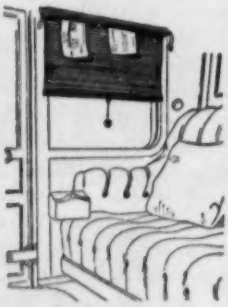
IF GUS WILSON should die—a wildly improbable event—a social historian could compile his complete biography. While he lives, the only solid sources of information about the man are some 355 stories. These provide a mass of data, but they are also shot through with tantalizing gaps. How old is Gus? Whatever became of Joe Clark, co-owner of the Model Garage? Many similar questions arise that cannot be answered positively. Careful analysis, however, of the works of Martin Bunn, Wilson's Boswell, does provide some biographical data:

Premiere. Gus's first public appearance was in July, 1925. Silent Cal was president then, the Scopes trial and the Florida land boom were in full flower, *Rose Marie* and *The Gorilla* were packing the theaters, and a coal-black Model T runabout could be purchased new for $260, starter extra.

A single sentence announces our hero: "Wilson was the mechanic of the firm, a gray-haired veteran of the automobile repair shop, who had been working on automobiles since the days when they were called 'horseless carriages.'" His first recorded customer was a Mr. Stevens, a bankerish man who, emerging from a sedan, announced that he was going on a long tour and thought "it might be well to have Wilson look the car over." Gus pronounced the sedan in good shape (one license plate rattled) and then delivered a long lecture on maintenance. Mr. Stevens, taking notes during the harangue, drove off pleased.

Early days. The Model Garage was a wooden structure, evidently converted from a barn or livery stable. While it had a crank-operated pump outside, there was also a wheeled portable tank to fill customers' cars. Joe Clark, partner and bookkeeper, tended the stock room and office and sold gas. Twice a pimply youth appeared, was identified as "Bill, the kid who did odd jobs," and then disappeared

Useful hints from Gus's files



Licenses rolled up in the curtain of a sedan, according to this 1928 tip, would not be embarrassingly mislaid when a policeman roared at you.

forever. There may have been a phone and a wrecker, but they are not mentioned for a year or two.

Gus was noticeably grumpy in those days, sometimes almost tactless. "Drat it" and "durn it" were his favorite remarks. He had a marked tendency to lecture. Once Al Taylor came to grief on Smoke Hill—a "cork puller" of a road outside town. "No need to go into details, Mr. Taylor, I can see how you got into trouble," interrupted Gus. "You got rattled and couldn't get the gearshift to work, and while you were fussing with it, the car started rolling backward—and here you are!"

But Gus's customers weren't touchy. "Oh, don't rub it in," said Taylor. "I'm a muttonhead all right." Such humility evidently warmed Gus, for he unleashed several columns of instruction on shifting, topped off with details on "how to do the double clutch." But he wasn't as genial as in years to come, though, since he concluded testily: "Drat it, Joe, why is it that every bird who scrapes through the driver's examination decides that he is the real thing? It would be better if he would spend a lot of time on lonely roads practicing gear shifting . . ."

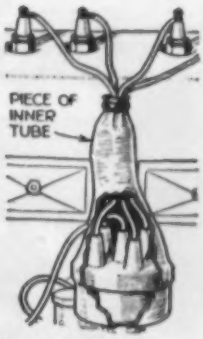
Gus's family. Sometimes there are scraps of personal information. Gus likes rabbit hunting but knows little of fishing until Joe introduces him to the art (in contrast to later years, when Gus has grown almost to be a fishing bore). We learn that he is a bachelor with some rustic relatives ("my cousins from up Winchester way"), a married sister, and a nephew named Henry. The latter, a sober young man with a bride named Grace, persuades Uncle Gus to accompany them to a 1926 auto show to help the young couple pick out their first car. For guidance Uncle Gus advises:

"If you can have only one car, the best buy is a closed model. I'd recommend a coach. You get a lot more for your money than you do in a sedan. Roadsters are all right for rich people who can afford to keep more than one car. If you'll take my advice, you'll lay off any car that is painted in very light colors. Dust and the tar they put on the roads will make one of those pale pink babies look like the dickens in short order."

Though oracular as always, Gus touches all bases when Henry asks: "What's the dope on overhead valves, Uncle? Are they really much better?"

"Theoretically they are—all the racing cars use them. But in a car for ordinary use I can't see that there's much advantage. They may result in a slight saving of gasoline as compared with the ordinary valves that are placed in a pocket beside the cylinder head. Also with overhead valves you can take the cylinder head off and remove it to a warm place in the cellar when you want to grind the valves instead of working in a cold garage. On the other hand overhead valves

To make fording a creek easier



Crossing creeks or freshets became simpler with a section of old inner tube lashed about the timer. But it wouldn't help out if the carburetor were set low on the engine.

Windshield wiped by left foot

Drivers tired of swinging the wiper knob by hand found this homemade rig lightened a fatiguing job.

are usually noisier, and as there are more parts in the valve mechanism, there is more to replace when things wear."

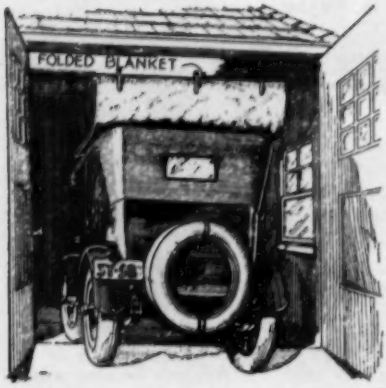
Henry is a glutton for information about controversial issues. "Do you think four-wheel brakes are safer, Uncle?"

"Don't worry your head over four-wheel brakes. I've fixed a powerful lot of brakes, and as far as I can see there isn't much in this four-wheel business as compared with one real good pair of brakes on the rear wheels. Four-wheel brakes are fine in theory but durned few of the outfits that I've looked over were working right, and on the low-priced cars I'm inclined to think that the disadvantages just about make up for their advantages."

(Readers distressed by this suggestion of old-fogeyism should remember that, in 1926, four-wheel brakes were a battleground among Detroit authorities, too.)

Gus tells Henry to "stay away from the accessories. All you need—at least to start with—are front and rear bumpers, a rear-vision mirror, a windshield wiper, and a spare tire!"

Device to brush top automatically



Cleaning the top was a nuisance, and many owners neglected it. But if an old horse blanket were attached this way, the job became automatic. Nosing in brought a moment of blind flying.

If your hat kept hitting the roof on bumps, an extra piece of fabric, pinned as shown, was advised.

Tender heart. Though the years did not age Gus Wilson, they did soften his didactic tendency. He still lectured the patrons mercilessly, but no longer backed them into the corner with brandished incivilities. It became evident that there was a tender heart beneath the gruff harangues. Occasionally high drama justified an exception, as when he saved John Ensley from a monoxide death: "Ensley stirred feebly. 'Where am I?' he murmured. 'You came darn near not being here at all, you crazy dumb-bell!' snorted Gus. 'You haven't any more sense than a billy goat!' "

Though brusque, Gus is by no means obtuse about personal relationships. Once when a woman crashed resoundingly into a parked car in front of the Model Garage, he displayed a perceptiveness unexpected from a bachelor:

"Seems to me it isn't all your fault, Mrs. Barnes. In the first place I notice that you haven't any cushion at your back, and as you are not as tall as your husband, you can't reach the pedals properly or push them hard enough. Then it's always bad for a man to try to teach his wife how to drive. No wife likes to play the dumb-bell before her husband, so she won't admit she doesn't understand everything he tells her the first time. She makes mistakes. He becomes impatient or sarcastic and the war is on."

Yes, Virginia. Persistent readers have occasionally pursued the question of just how real *is* Gus, anyway? (Probably some of them were, as children, the kind of tots who axed the cuckoo clock to see what the little bird ate.) To calm their anxieties, the magazine twice ran articles

[Continued on page 202]

Underwater Surgery Gives Fish a New Eye

THIS fishy operation took place 22 feet under water. Patient: a blind bat ray. Place: California's Marineland-of-the-Pacific aquarium. Surgeon: Dr. H. George Blasdel, wearing diving gear. He's transplanting a cornea from a bat ray caught at sea to the blind eye of the other ray.

Free Power? Nine Billion Cat Pats Light Lamp

WITH the family pet and an electrostatic voltmeter, a N.Y. Con-Edison engineer has computed how much electricity a cat puts out when stroked on a cold day. Some 9.2 billion cat pats would light a 75-watt bulb for one minute. Pussy's tail was NOT attached to the meter.

Little Great Lake Helps Engineers Plan for Snug Harbors

THIS indoor sea at the University of Michigan helps engineers find out what barriers will withstand Lake Superior's 10-foot waves. Here rollers, scaled down electrically to 1¼ inches, pound at a model breakwater. It's part of the state's plan for a series of small-boat emergency harbors along the lake's 1,000-mile shoreline.

Germany: Car with a Front Door

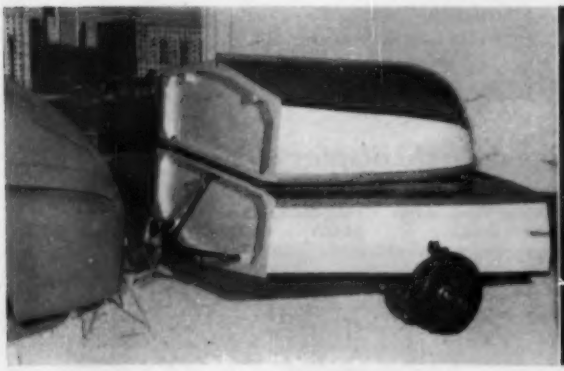
THE German Motocoupe above is shorter than an ordinary car is wide. But even a bulky man can climb in or out with dignity when the single door is opened out at the front. The three-passenger car has a top speed of 55 miles an hour.

England: Bovine Tape Recorder

THIS harness keeps tabs on a steer's day. Wavy lines on tape show how many times he stretches his neck to graze and how often he lies down, stands up or even flicks his tail. English breeders expect the data to help the search for tenderer beef.

Double-Strong Solar Batteries to Power Telephone Lines

SUN-POWERED batteries like the one above have doubled in efficiency in the time since they were introduced one year ago, Bell engineers say. The "cells" now yield 100 watts per square yard of silicon surface. First practical test of the batteries will come this summer. They will power amplifier stations of a rural Georgia telephone system.



Russia: Boat That Folds Up

A NEW Russian folding boat (above) jackknifes for easy transport. The hinged sections, faced with bulkheads, are bolted together when the craft is launched. On the road, the same bolt holes take the tow bar. Wheels and axle clamp to the hull.

France: Guitar That Blows Up

FELIX BARREL, a Paris night-club musician who tired of carrying around a bulky guitar, invented the pneumatic instrument above. He claims the collapsible sound box, when blown up, gives out with the same tones as an ordinary guitar.

How Experts Shoot Fireworks Safely

By Gilbert Hill

IF YOU drive out to witness a professional fireworks display this Fourth of July, the chances are two to one that the show you see will be put on by a crew from a company that's been in this weird business since your grandfather was a boy.

Its workers ride around the country in trucks loaded with blasting powder, magnesium, powdered aluminum and other explosives—then shoot it off just for fun.

The men of the Thearle-Duffield Fireworks Co., headquarters in Chicago, perform not only on Independence Day but also at Christmas, and at winter carnivals, football games, state fairs and anywhere and any time that someone wants fiery patterns plastered on the sky.

Or just some noise.

A Thearle-Duffield show generally rolls into town in a brace of trucks. One totes equipment, the other the "merchandise," the fireworks. The equipment falls into two categories. There are poles, frames, wires and electrical equipment for the displays or "set pieces" on the ground; and the mortars for firing aerial bombs and color or for just making noise. The mortars look like lengths of stovepipe set in batteries of four or five.

Hours for preparation. Now the work begins. A 30-minute show takes a crew of men several hours to prepare. Every display is on a "frame" or series of frames.

Each frame is eight by 10 feet, built like graph paper, only on one-foot squares. Tacked to the frame are queer-looking willow withes, perhaps ¾ inch in diameter, which are the "lines" of the design. Most of them are put in place at the studios in Roby, Ind., but Jack Duffield can create one in an emergency from a drawing "in the field," just as you transfer a pattern to graph paper.

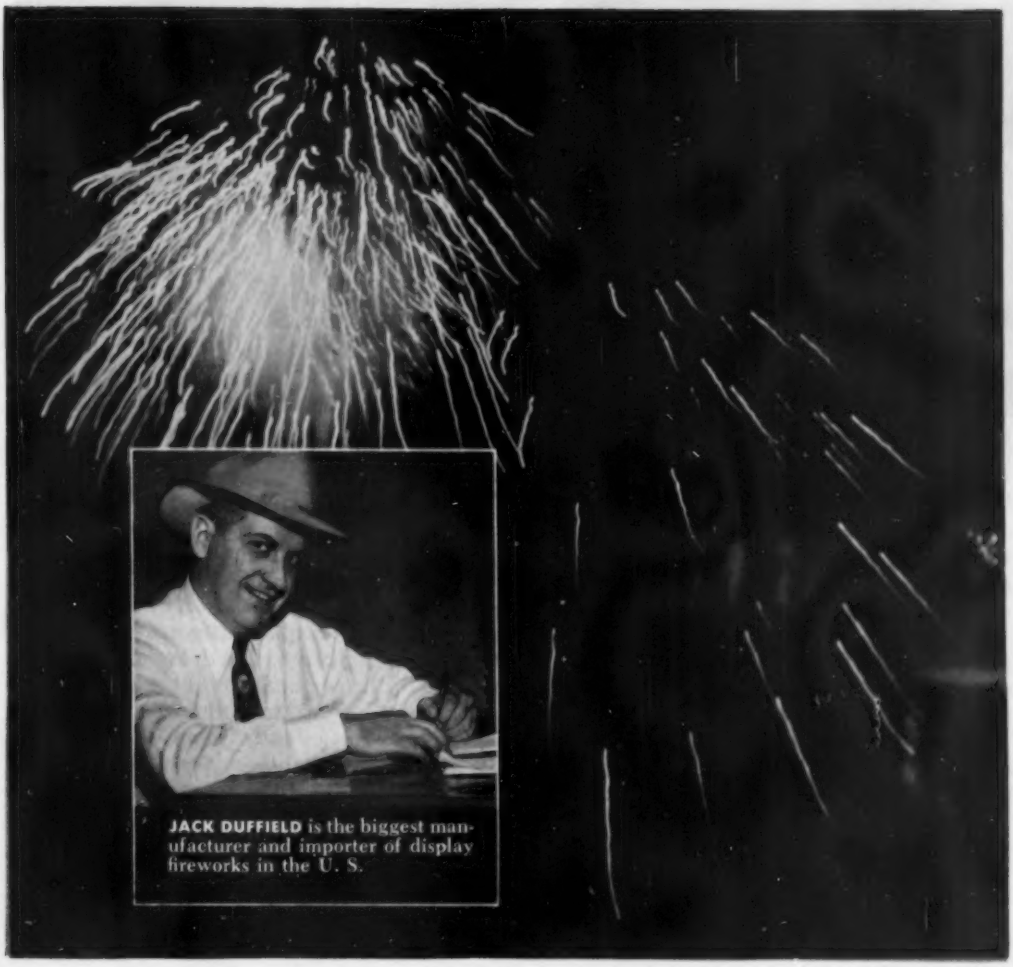
Each frame is numbered. When the parts go together the withes form that face, or temple, or symbol of the 4-H

This is what's inside a flag-carrying daylight display bomb

TO SHOW HOW firework bomb is constructed, Duffield slices into its cardboard covering.

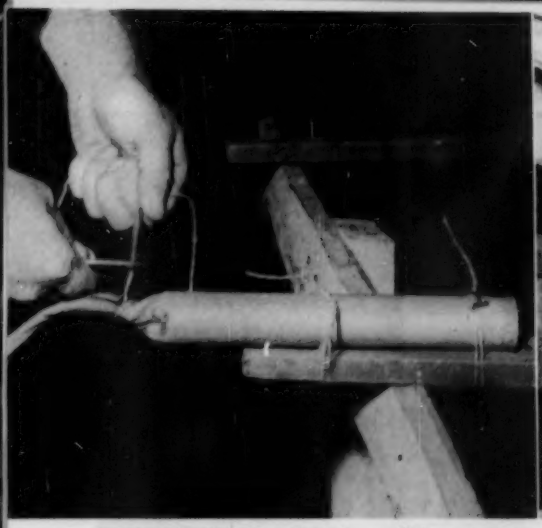
KNIFE BLADE removes tightly packed tissue-paper flag, parachute and balance weight.

POWDER pours out of the Japanese-made bomb. Weight (next photo) is hard-packed earth.

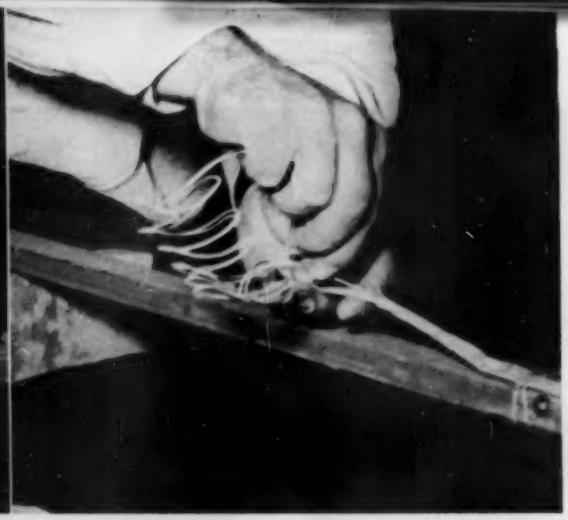


JACK DUFFIELD is the biggest manufacturer and importer of display fireworks in the U. S.

"MR. FIREWORKS" Duffield shows the size of the flag that was contained with other components in the bomb—a ball about as big as a small grapefruit.



FUSING THE PARTS so that they will burn is one of the main jobs of readying a fireworks show. Here a fuse, made of a tube filled with black powder, is tied to a "piece."



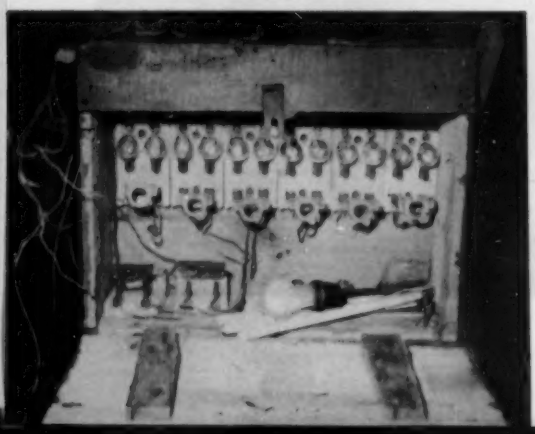
WIRE BEING INSERTED into a fuse is called a "squib." Attached to a six-volt automobile battery, it will short and throw a spark to light the powder and set off the fireworks.

Club, Boy Scouts or VFW, or the figure of Uncle Sam. There is, of course, always an American flag.

Men armed with a roll of heavy twine, a package of pins, and a sharp knife—plus handfuls of paper tubes that look like conventional firecrackers but are not—put the displays together. The tubes, carrying chemicals which produce various colors, are stuck upright on pins. Then a fuse, which is a rolled paper filled with black powder, is tied to each small tube.

The end of the fuse, finally, is hooked to an electrical gadget called a "squib" which, attached to a six-volt automobile battery, will short out and throw a spark.

CONTROL BOX for an entire fireworks show. One switch will set off a series of displays, usually while mortars are being reloaded for another ear-splitting aerial salvo.



Wires from a control box, hundreds of feet away, lead to the squib.

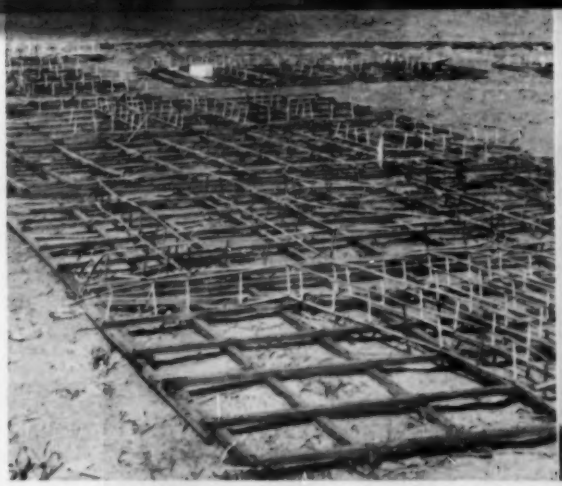
Aerial bombs can be, and are, lighted the same way as the displays. But generally they're still lighted by hand, largely because steel is heavy, and it is easier to fire one battery several times than have enough mortars for an entire show.

One man loads, another fires. To load, a man grabs a bomb by a previously tied long fuse and just drops it down a pipe, leaving the fuse sticking out a long way. Right behind him will be the one who is firing, carrying a long pole, with a stick of magnesium, or "portfire," on its end.

He lights each bomb and scrams. A mortar can tip over, so it must be set solidly. It can burst. So men stay back. It can blow up prematurely, so it isn't loaded until it is cool and the fire is "all out."

There is usually a protective earthwork behind which men can drop if there is an accident, just like a soldier, and "let the stuff fly by."

The usual procedure is to fire the mortars and wait for them to cool, while a couple of other men sitting a hundred yards or so away pull some switches for the displays. One little switch with six-volt current can set off several hundred feet of action.



BIG FIREWORKS DISPLAYS are built up from frames such as these. When they are erected and tied together, all the fuses are fired at one time by remote control.

NIAGARA FALLS SPECTACULAR in the making. Capsules on the wires are filled with aluminum or magnesium powder that make a brilliant, flash-burning light.

The work is risky. No one knows that better than Jack Duffield, vice-president of the company. Born into a fireworks family, he manufactures strictly for professional display. Many years ago the company stopped selling fireworks to the general public.

"We didn't want to be responsible," explains Duffield, "for the eyes, fingers and maybe the lives of young Americans."

Outsiders kept away. Fireworks men do not want any strangers around when a show is being "fired." It makes them nervous.

One crew member was in a hospital for a couple of weeks last year. He didn't move quite quickly enough after he had lighted a bomb in a mortar and the thing suddenly tipped over in his direction. He caught some chunks of packing paper in the hand and around the legs that cut like knives.

He was hurt. But a less experienced man might have been killed.

Another time, in Milwaukee, a big crew of men had worked all day stringing eight miles of wire, setting tons of explosives, erecting poles, frames, and support wires.

They completed the job about 3:30 p.m., set their squibs, and prepared to rest until about nine p.m. Then wham! The whole thing went at one time in broad daylight.

The show had been placed on a concrete roadway out to a Coast Guard installation in a lake. Under that concrete, encased in conduit at least three feet away, was a 440-volt power line. But there was enough induced current to break a six-volt squib.

Despite the ever-present danger, the company has never had a fatal accident during a show.

Lifesaver in war training. Jack Duffield likes most to remember how fireworks helped to save lives during training for World War II. As Captain Duffield, of the Chemical Warfare Service, he had a job, to show men how it felt to be in the midst of a battle. So he helped create fireworks that sounded like machine-gun fire, or rifles, or flak of antiaircraft guns.

Almost all the shows you'll see given by Thearle-Duffield are "made in America." A few Japanese fireworks are used, chiefly bombs that burst in daylight and release American flags, or other novelties. A little comes from France or Germany or Czechoslovakia, but Communists rule in China hasn't meant a thing to Mr. Fireworks or his company. He hasn't used anything from China for many years anyway. END

Ice Creates a Problem

. . . on aircraft wings in Lockheed's Burbank, Calif., "blizzard tunnel," where de-icing devices are tested. Temperatures plummet to 35 below zero, and the wind howls at 270 m.p.h.

Ice Solves a Problem

. . . for Olympia, Wash., telephone men who had to lower a 160-foot conduit 18 inches. They dug out under the conduit, propped it on cakes of ice. Melting dropped the conduit evenly.

Whether you call this 9-hp. job an automobile or a scooter . . .

. . . it's a heap of fun to drive—and cheap to run.

Meet Messerschmitt's Three-Wheeled 'Bomb'

By E. D. Fales Jr.

WILLY MESSERSCHMITT, who used to make German fighter planes, is building automobiles now. And he's trying to crack the U.S. market with a two-passenger car—maybe you'd call it a scooter—that looks like a toy outside and a fighter plane inside.

This little cloverleaf-on-wheels is made in the Messerschmitt works at Regensburg, West Zone, Germany. It comes over knocked down in a crate. But for $895, New York, you buy it completely assembled.

Messerschmitt has been developing it for two years in Europe. He calls it a Cabin Cruiser, but it has already been dubbed the "Bomb."

It's so little you can almost go cross-town *under* traffic. We measured and found you could tunnel right under some big trailer units: 47 inches from ground to bubble-top. With a wheelbase of only 80 inches, it's surprisingly long: 111 inches over-all, about half as long as a Cadillac Eldorado.

Its air-cooled Fichtel & Sachs single-barreled engine whips out nine hp.

I spent a day trying out the little Messerschmitt with Steve Falk, a U.S. sales manager.

Other drivers stared down in disbelief. A truck driver bawled at us from his

Here's how you get in. The "Bomb" is only four feet wide, so parking's a cinch.

CHECK STRAP keeps canopy from flipping against next car. "Bomb" is 111 inches long with 80-inch wheelbase and 36¼-inch track. Air-cooled motor is in compartment over rear wheel.

ONE-CYLINDER ENGINE puts out nine hp., can spurt to 9½, at 5,250 revs. Tank holds three gallons (gas and oil, 25:1). Bore: 2 7/16; stroke: 2 9/32. Chain drives rear wheel.

cab up in the blue yonder. We slid Plexiglas panels open to listen.

"How-mucha-get-on-a-gallon?" he demanded.

"A hundred miles," I shouted back.

"A little *more* than a hundred," Falk corrected.

Those panel windows come right out in hot weather. You can toss them into the "trunk"—a little cave behind the passenger seat. This nook, 6¾ inches high by 23½ by 19½, won't carry much freight. But if mama needs more space for shopping, she can leave the back seat home and pile the groceries in its place. Or she can buy a luggage carrier to hang on the right side.

"I say this Bomb is perfect for shoppers, students and guys going to work," said Falk. "Also for boatowners."

"Why boatowners?"

"To take along *on* their boats."

You make a date to meet Falk in a diner for coffee, and then you're going to ride in the Bomb.

You get to the diner first. Suddenly you see customers run to the windows. Here comes the Thing. Falk's head sticks up in the bubble like a Martian with a crew cut. He whips into a parking spot.

Then he throws back the dome, pushes against the floorboards—and the leg-powered ejection seat goes to work. It slides back a foot and up a foot. Falk is clear of the "wheel"—a pair of midget handle bars (new models will have a half-wheel). He hops out grinning.

While you're having coffee, you see a car whirl into the parking area, slam on brakes, and back out scared. The driver just didn't see the parked Bomb.

Now you climb into the pilot's seat. You stretch your legs straight ahead, grip the sides and lower your weight gently. The seat pivots forward and down with you, reversing the ejection action.

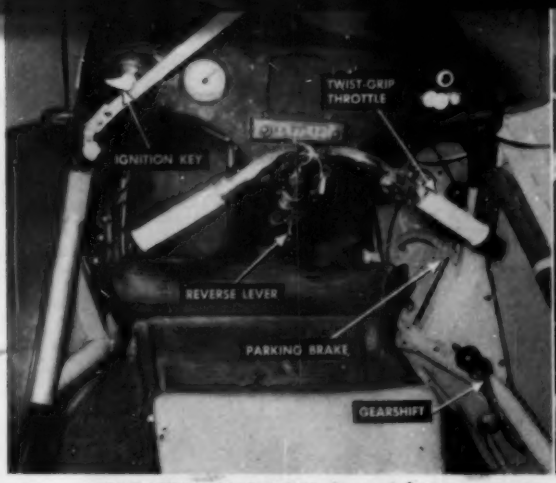
Falk sits close behind you, legs straddling the pilot seat. You pull the dome over, and snap-lock it down.

You straddle the steering column. Right foot: gas and brake; left foot: clutch. You shove a plastic key into the ignition lock on the dash. Then you poke the starter button.

Then you're off. The Bomb quivers like a small plane waiting to take off. You feel as if you're waiting for tower clearance.

You gun the F. & S., flip the "wheel"—and the Bomb jumps 10 feet sideways! The steering ratio is 1 to 1.

On your right, looking like a control stick, is the gear lever—a foot-long bar topped by a black ball. It has three positions: forward, neutral and back. To start, you shift back to low. Now you pump the bar forward. Pump once and you're in second (12 to 22 m.p.h.); pump twice, you're in third (up to 35



PUSH-PULL GEAR LEVER is at right, reverse on steering column. Your right thumb on twist-grip throttle presses horn and dimmer. Speedometer goes to 60. Loose key is for canopy.

YOU CAN LIFT "BOMB" since it weighs only 485 pounds. Note tubular frame, steel skin, rubber shock. Wheels have internal-shoe drum brakes. Tires: 4.00 x 8s. Turn radius: 13 feet.

m.p.h.); pump three times, you're in fourth for cruising (35 to 50).

Shoppers go pop-eyed. You pass five boys running. One stops as if shot, claps a hand to his head and points frantically. You whiz by two blondes. One looks down, points, and shrieks.

You turn a sharp corner faster than you intended. But there's no tip, no skid. Your center of gravity is only a foot off the road.

"This thing came over from Europe last week," Falk says. "I put it together in 2½ hours with wrench, screwdriver and pliers. And I'm no mechanic."

WHEN YOU'RE READY to take off, you pull bubble over and latch it shut. Turn blinker is by light.

He points to a knob. "Let's have some music. And try that heater." Music fills the dome. At your elbow, a jet of hot air comes from a 1½-inch fiber hose—the heater.

You head out of town. The chummy little handle bars have rubber grips. The button under your right thumb is the electric beep-horn. The light-dimmer switch is there, too.

Speedometer goes to 60. Waiting at a light, you look the dash over. The speedometer dial reads from 0 to 60. There's a push-pull light switch, a choke pull, and high-beam and turn blinker pilots.

Jouncing out of town, you look around and see a cop in a prowl car. You take a quick speed reading: 32. You wave at the cop. He peels off into a side street.

At nine hp. you aren't exactly driving a Jaguar. But in 200 feet, level, you work her from 30 to 40, without downshifting.

You come to a slight grade—and the Bomb needs a boost. You downshift, and up you go. Your speed momentarily drops to 35.

You turn into a driveway to try backing. You shift to low, then lift a reverse lever on the steering column. Now you're in reverse-low. You turn around and head back for the diner. Not until you flip the bubble and hop out do you realize you've been grinning like an idiot for the past two hours. END

Four hours of illumination each night makes these flower plants bloom way ahead of time.

Trick Weather Makes Plants Bloom

TAKING A STRAWBERRY'S TEMPERATURE during heat treatment. Pathologists "bake" yellows virus out of the young plants by giving them a constant 100-degree fever for two weeks.

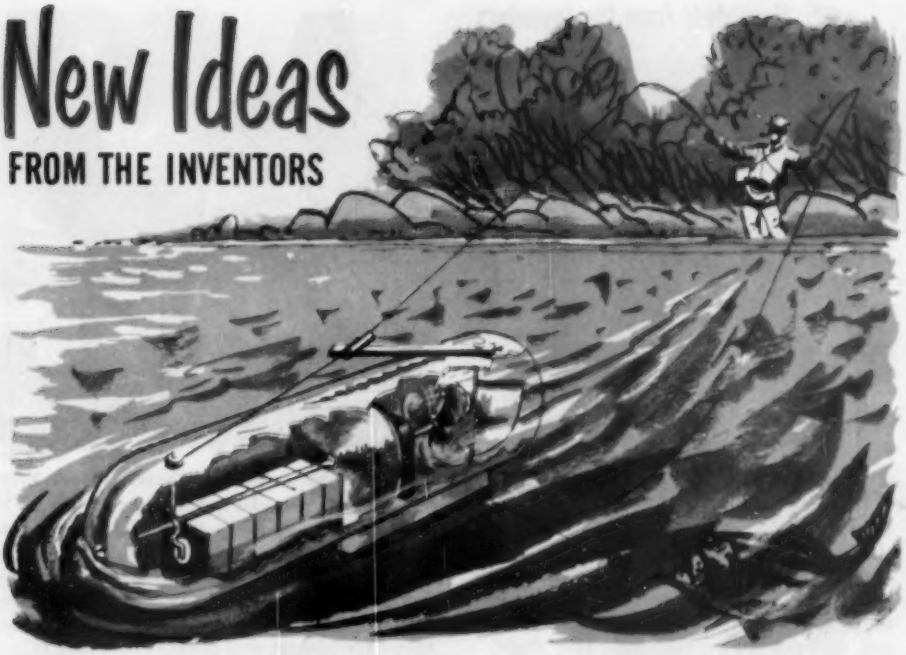
SCIENTISTS at the University of California are playing tricks on plants with electric lights, heat and humidity. The plants can't complain, and florists and farmers are beginning to benefit from the results.

By flooding daisies and asters with artificial light at night during the short days of spring, university experimenters have fooled them into thinking it was already summer and bursting into bloom. Later, during the short days of fall, chrysanthemums have been deceived into thinking it was still summer, and they have held off blossoming as long as they could. Result: Flowers can be produced out of season, when they bring highest prices.

At another University of California campus, plant pathologists subject young strawberry plants to 100-degree temperatures for two weeks. The pathologists expect to produce virus-free strains this way.

At a third campus, a special humidifier helps heat and sunshine goad plants into growing their utmost, thereby aiding investigators who are seeking ways of developing plants resistant to microscopic plant worms. These plant worms, called nematodes, cost California farmers millions of dollars a year in damage.

New Ideas
FROM THE INVENTORS



1 Motor to Tow and Cast Line. This battery-powered fishline tower would carry a hook beyond casting range, and then release it so an angler could play it in with a standard reel. By manipulating a control line, a fisherman could steer, stop or beach the tower. To troll, he'd send it to midstream and "walk" it parallel to the shore.

2 Razor to Be Thrown Away. An inexpensive one-shot razor with nonchangeable blade might solve shaving problems for men who travel light. Thoughtful hosts could keep a few on hand for unexpected overnight guests; it might also be dispensed in public washrooms or given away by hotels.

3 Hanger to Repel Moths. You wouldn't have to seal a closet or stuff the pockets of your garments with mothballs if you could load vapor pellets inside each hanger. The odor escaping from the hollow, perforated frame of this hanger would saturate but wouldn't stain the cloth.

Please turn the page for more new ideas

MORE New Ideas from the Inventors

4 Gun to Swat Flies. This rubber-band-powered insect catcher might substitute marksmanship for acrobatics in the fly-chasing marathon. With the flexible paddle cocked flat against the pistol-grip handle, you'd take a bead on a fly and squeeze the trigger. The blade would snap around and nail your prey before it could take flight.

5 Guide to Improve Shrub Trim. You could trim shrubs quickly, accurately and uniformly if you had a shaping bar like this to guide your shears. A hollow stake sunk permanently in the center of a shrub or evergreen would serve as a socket for a removable cutting guide. Guide bars could be made for hedges and a variety of shapes.

7 Blanket to Help You Tan. A sunbather could spread this blanket on a beach, lawn or roof, and use it both to lie on and to direct the sun's rays. Made of canvas or other heavy fabric, the blanket would have two or more panels faced with polished aluminum foil. A folding bracket supplied with the blanket would hook into reinforced tabs in the hem and would support the foil-covered panels in raised position. By adjusting the blanket to the position of the sun, a bather could expose himself to both direct and reflected rays, and thus get a faster, more uniform, all-around tan.

6 Umbrella to Hold Packages. A utility umbrella pocket that could hold a plastic coat or pair of rubbers would keep all your rainwear in one unit. Stitched between adjacent ribs, this waterproof pocket would increase in size when the umbrella was opened, so it could be used to carry small packages, protect them from rain.

8 Blind to Serve as Awning. This flexible metal blind would roll up and down like a window shade or tilt up awning fashion to block bright sunlight. It could be raised and lowered from inside. Fully drawn in its grooved frame guides, it would serve as a weather-tight storm window.

9 Springs to Steady Paint Can. A paint bucket held down by these spring clips couldn't topple off a stepladder shelf. One end of each spring would be fastened to the platform, the other would hook over the bucket rim. The rim hooks would also anchor a bent metal rod that could be used for scraping excess paint off a brush.

U.S. patents on these inventions have been granted to: 1. Angus Lumsden, Little Neck, N.Y.; 2. Alexander Samko, NYC; 3. Leon and Ruth Lefton, Brooklyn, N.Y.; 4. Earnest King, Minneapolis; 5. William Brownell, South Bend, Ind.; 6. Rose d'Ippolito, NYC; 7. Marshall Pursel, Brunswick, N.Y.; 8. S. del Rio, New Canaan, Conn.; 9. O. Ariss, Big Rapids, Mich.

Six-Section Snow Train Rolls on Tires Seven Feet High

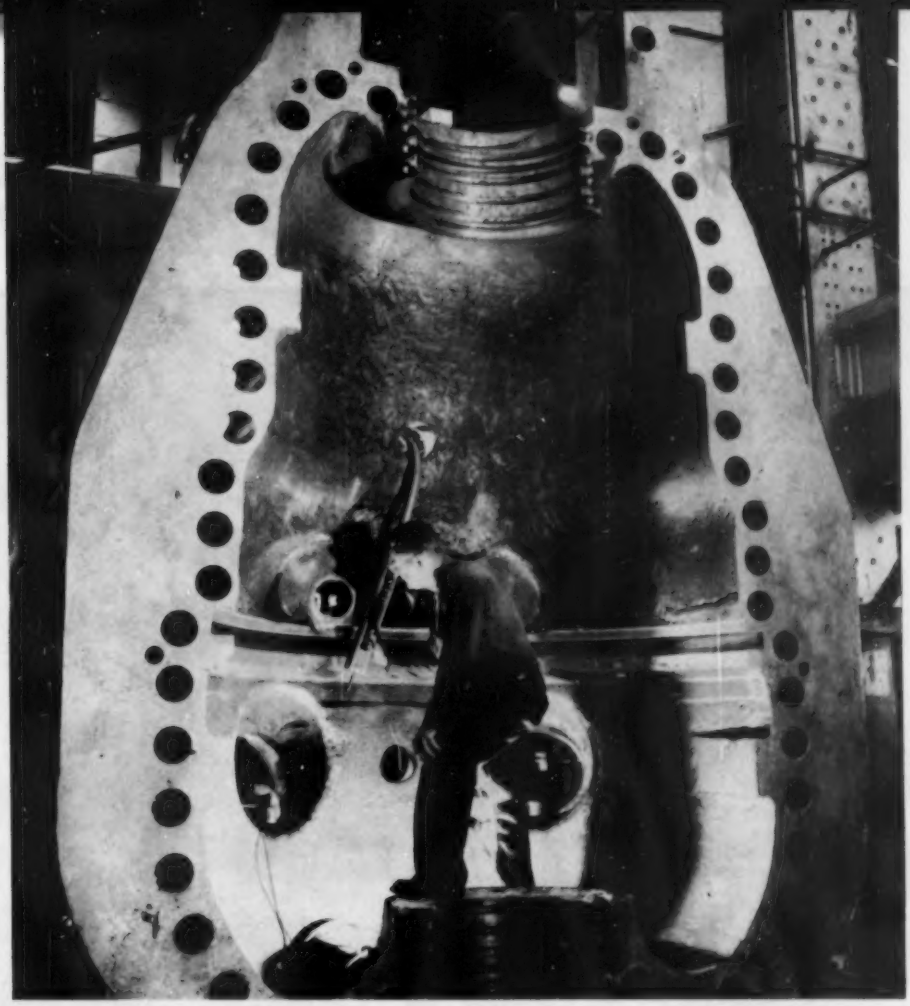
BUILT to snake its way across the Arctic, this 274-foot-long Sno-Freighter is probably the world's largest vehicle on rubber tires. It consists of an enclosed power-control cab and five flat cargo cars that can haul 25 tons apiece. In the lead cab car are diesel-electric generating units that deliver driving power to the 24 wheels, each of which has its own electric motor. The huge Le-Tourneau transporter gets traction in heavy snow with tires that are 88 inches high and 37 inches wide. The metal control car, insulated against severe cold, has sleeping accommodations for a crew of four.

Bike Sounds Like Motorcycle

THE aluminum-colored fiberboard gadget attached to this bicycle looks like a pair of twin cylinders. The gadget's two fingers make contact with the spokes, to produce the motorcycle sound. Bradenton Distributors, Bradenton, Fla., make Bikomotor.

Shell Carries Own Radio Set

IN THE nose of this 20-mm. shell is a tiny radio transmitter that will withstand acceleration shocks of over 30,000 times the pull of gravity. The Navy uses the device, powered by a mercury battery, to study the spin characteristics of small projectiles.



Metal Shell for Steam Turbine Is Shaped Like Giant Pear

THE man inside this 15-foot-high, 26-ton steam-turbine shell is machining the fit for a valve seat. The shell will become part of one of the world's largest turbine-generators, and the first large generator with liquid-cooled conductors. General Electric is making it for a Cleveland Electric Illuminating Co. power plant.

Brief Case Hides Built-in Recorder

UNLESS you opened the special zipper flap, no one would know that this brief case contained a battery-operated tape recorder, complete with microphone and a preamplifier for earphone playback. Made by Amplifier Corp. of America, the machine costs $225.

As more gales sweep England

Littlest Ships Battle

"Calamity Corner" summons lifeboat crews time and again

THE GOODWIN SANDS, a bank in English Channel, have wrecked ships since Roman galleys. Recent victim was this lightship guarding them. Three lifeboats failed to rescue crew.

U.S. SAILORS in the last war named Goodwins "Calamity Corner." Five American ships were lost there in 1946 alone. U.S.'s *Helena Modjeska* (below) sank despite tugs.

EVEN IN THIS AGE OF RADAR, Goodwin Sands are strewn with wrecks, viewed between storms by tourists. British name for sands, which have taken 50,000 lives: "The great ship swallower."

Super-Storms

Britain's unstoppable lifeboats make a record number of trips to shipwrecks in seething seas.

By Gardner Soule

THE littlest ocean-going ships on earth today are battling some of the biggest storms ever.

The ships are the 154 lifeboats of 151 stations that dot the coasts of the British Isles. The length of most is around 46 feet; their weight, 20 tons; their maximum horsepower, 120 (split between two 60-hp. diesels).

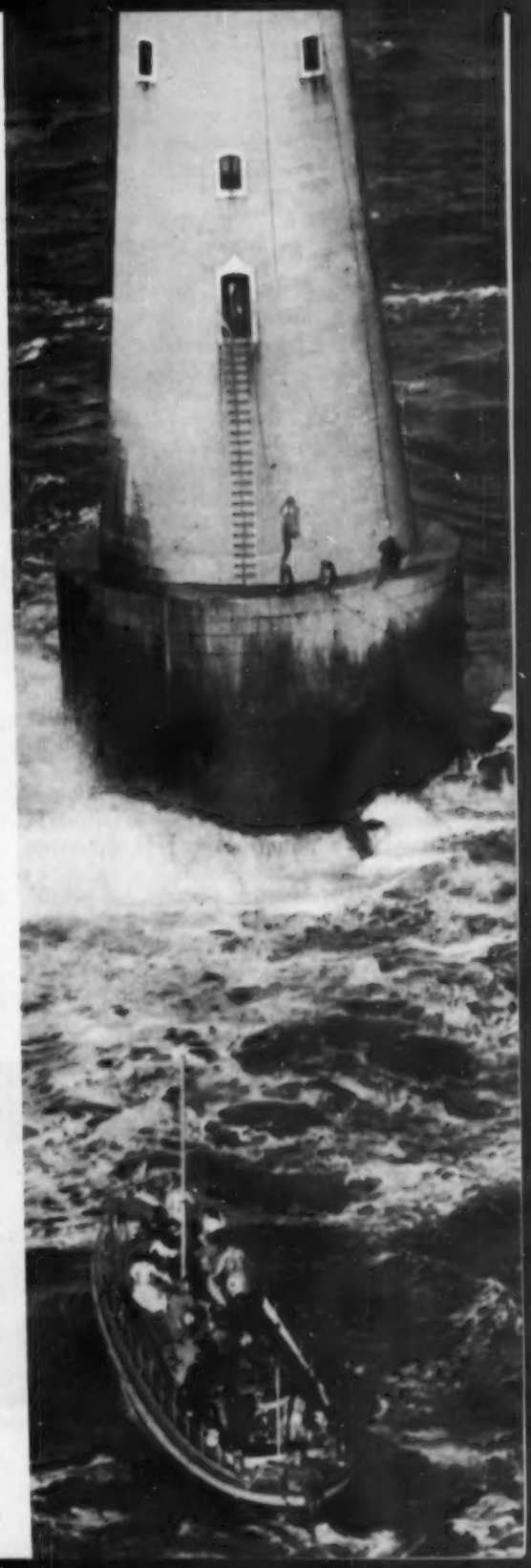
The lifeboats sail as far as 100 miles from shore in the North Atlantic, the Irish Sea, the English Channel and the North Sea.

Here, in World War II, the lifeboatmen kept frantically busy (they thought) rescuing men from bombed, mined and torpedoed ships, and shot-down planes.

Yet, in 1954, the lifeboats made 658 rescue trips—51 more than their average for the war years, almost twice as many as in any prewar peacetime year.

Super-storms alone were the big reason. There were only two months in 1954—June and July—when no gales of 70 m.p.h. or higher were recorded in Britain. In three—January, November and December—there were storms of 100 m.p.h. or more.

There has been no letup in the storms this year. In January, America's blue-ribbon Atlantic liner, the *United States*, reported her worst trips to and from Southampton, England. On one, the seas piling into Cherbourg, France, right across the channel from Southampton, were so bad it took a fleet of tugs to get



WHOLE SERIES OF WINTER STORMS kept Bishop Rock lighthouse cut off for 29 days. Finally St. Mary's lifeboat brought supplies, took off men (one is against tower) by lifeline.

the *United States* out of the harbor to sea. Even a motor launch can normally make this exit from harbor under her own power.

In March, another super-storm drove a Portuguese luxury passenger liner ashore near Plymouth, England. Many storms can do this, you say? Yes, but this ship went on the rocks in a protected waterway. You can imagine the force of the storm outside.

British scientists are at their wit's ends trying to explain what the English call their "peculiar" weather. Some tried to hang it on the enormous number of aircraft now operating over Britain, but this didn't stick. Others pondered atomic explosions, then announced they were not the cause.

The only scientists who seem to have a clue are Britain's glacier experts, who point out that glaciers in Iceland, Greenland and Scandinavia have now stopped shrinking and are getting larger. This, the glaciologists say, may mean colder and "deteriorating" weather—for a century or two.

To the men of the lifeboats, this long-range forecast, if it offers no comfort, is at worst a promise they will get more of what they are used to.

The lifeboatmen already are accustomed to waves so high they blot out the lights of lighthouses; seas so rough they drop the boat far beneath a man's feet and leave him to come crashing down; and weather wherein the skies, rain clouds, and sea are the same dark gray and you cannot tell them apart. Sometimes what looks to a man in a low lifeboat like a rain cloud is in fact hundreds of tons of ocean about to flatten him in the cockpit.

But nobody makes the lifeboatmen sail their teapots into the tempests. All aboard are men-who-don't-have-to-be-there.

They are, like three-fourths of the firemen in the U.S., almost all volunteers. The only full-time paid member of a crew is likely to be the motor mechanic.

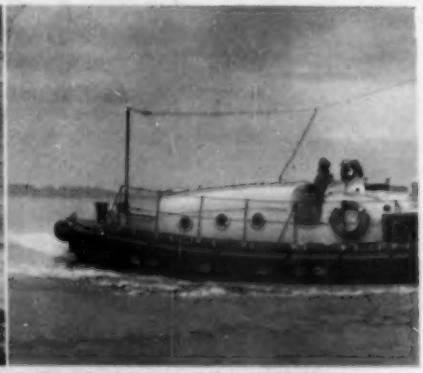
The lifeboatmen are of many occupations, but all, one way or another, follow the sea. They may be amateurs (yachtsmen) or professionals (fishermen), but they are all crackerjack sailors. Their service is by far the biggest in the world dedicated only to saving lives. Only the U.S. Coast Guard, which has many other tasks and more coasts to cover, has more lifeboats.

When an SOS comes in, the British lifeboatmen are summoned from their homes by a rocket (called a maroon) that beckons them by a roar like a cannon and/or its light—fireworks across the sky. The noise of storms being what it is today, it is frequently the flash that rounds up the crew.

Any lifeboat sailor is free to make or refuse any trip of his boat, as he chooses. Actually, no boat yet has sailed without a full crew.

Instead, the boys keep setting new

Fastest method of launching lifeboats is by means of ramp.



Popular-size model is 46 ft. 9 in.

Like members of the U.S. Coast Guard, British lifeboatmen are champs at firing lifelines.

records for the time it takes to round up a crew and get going. The present mark, five minutes, was set recently by the Great Yarmouth boat. All of her crew had seen a storm come up, scented a call for help, and gathered at the local pub. When the SOS came in, all they had to do was put down their beer and pull up their boots.

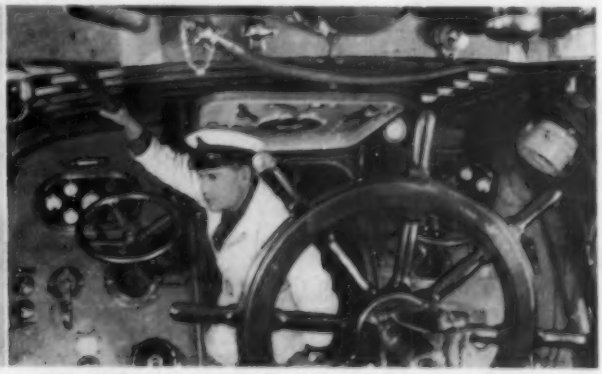
Even the skippers are men-who-don't-have-to-be-there. The skipper, or coxswain, alone decides to sail or not to sail into today's boiling oceans. The result of this arrangement is that the boats, providing there are lives to be saved, keep right on going out into weather that makes shipwrecks of vessels 500 or even 1,000 times the size of the lifeboats.

Nobody makes anybody do anything in the Royal National Life-boat Institution. That, in fact, is the big point of the service.

Nobody, for instance, made Richard Walsh, coxswain of the Rosslare Harbor

[*Continued on page 206*]

Colors are mainly red and blue.



Control cabin of new boat is crammed with instruments.

New Aids to Living...

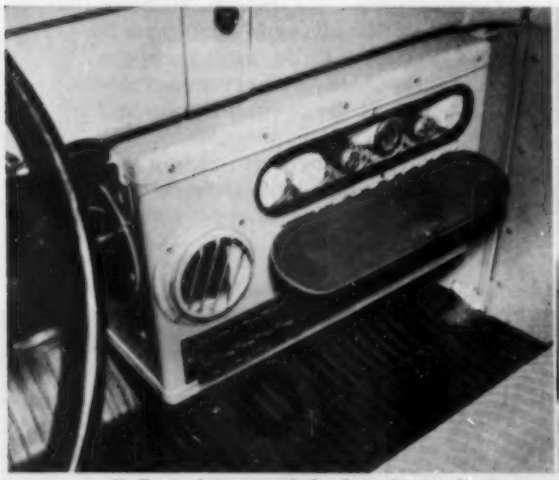
1 Jam-packed with jelly, this metal tube may be a sign of things to come. A couple of squishes by this youngster covers a slice of bread, eliminating dripping spoons and jars. Food in tubes has long been popular in Europe. Packagers hope to start the same trend here.

Further information on these new products can be obtained from: 1. National Packaging Exposition, Chicago; 2. Hotpoint Co., 5600 W. Taylor St., Chicago 44; 3. K. G. Niblack Co., 109 Huntington Ave., Buffalo 14, N.Y.; 4. Sampson Chemical & Pigment Corp., 2830 W. Lake St., Chicago 12; 5. A.R.A. Mfg. Co., 1041 Foch St., Fort Worth, Tex.; 6. Audio-Master Corp., 17 E. 45th St., NYC.

3 Squeeze the handles of this scissorlike carving aid, and your roast or fowl is securely held in place while you slice away. It's made of die-cast aluminum and adjusts to grip large or small objects.

4 Germs and unwanted odors are destroyed by this air purifier, which uses an ultraviolet lamp to do the job. It's slipped into the cold-air return of your furnace or into an air-conditioning duct.

2 Buttons, buttons—this model kitchen really has 'em. Punch one and a spice rack drops into view over the sink. Punch others and a full set of utensils swings down, coffee maker, mixer and toaster pop up, the electric range and wall oven (at right) start cooking, and accordion doors lined with an assortment of pots and pans swing open.



5 Dog days won't bother the truck driver if he gets this fancy heater-air conditioner for his cab. An extra is the storage compartment shown in the unit above, which can be kept either hot or cold.

6 A phonographic hybrid, this device is said to have the advantages of both tape and record. A plastic tape, grooved like a record, runs through the machine, giving eight hours of steady playing.

What Was So Good About the Continental?

Soon to be reborn, this famous car began as an accident and grew to be a national cult.

By Kenneth Wylie

LIKE Greta Garbo, the Lincoln Continental seems to have been a wish image for a whole generation of Americans. Certainly, never have so few cars evoked so much well-bred sentimentality.

From the fall of 1939 to the spring of 1948, a total of only 5,322 Continentals was built—less than one day's full-tilt production of 1955 Fords. Yet two-thirds of this number, about 3,500 cars, are still on the road, still lovingly polished after every sprinkle of rain. Some 600 proud owners belong to a national organization devoted to preserving and extolling the breed. The value of a prime specimen—at an age when most cars are barely worth the price of the shoes they need—stays solidly above $2,000.

When the Ford brass announced recently that they would bring out this October "the finest car on the road," at a price close to $10,000, apparently nobody for a moment considered calling it anything but the Continental.

What was so good about the old car?

Our first witness is Edwin N. Andrews, of Evanston, Ill., owner of a mint-condition 1941 coupe: "Unlike most European custom cars, which look uneven and cobbled because of the many designers and craftsmen working on them, the Continental was all of a piece. It will be a lasting classic because it translates a basic feeling, the enjoyment of speedy travel, into permanent form."

Lithe but not lordly, prewar Continentals had curved, boat-hull lines at fenders and hood.

COP STOOPS to chat with Elliston H. Bell Jr., Lincoln Continental Owners Club chairman, before parade of 200 cars in a rally.

Said industrial designer Walter Dorwin Teague: "It had shapes and contours but no detail . . . There was as little chrome as a car could be built with."

Architect Frank Lloyd Wright, who owns two Continentals, believes that they are the most beautiful cars ever designed. Writer John Steinbeck says: "I have had many cars but none that so satisfied my soul as the Continental."

Dissenters. Such enthusiasm has inevitably stimulated a few contrary-minded grumps: "The car demonstrated the enormous power of snob appeal in the U.S."

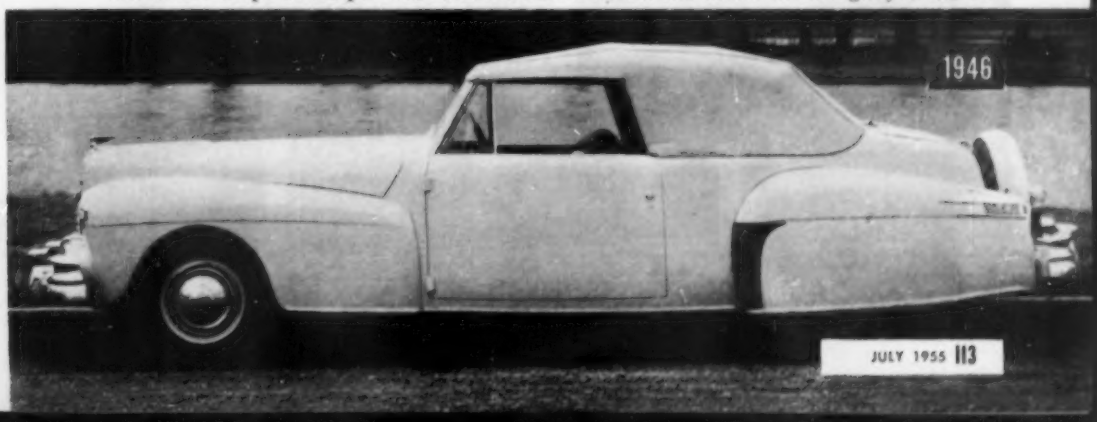
But most critics have zeroed in on the car's engineering: "It looked better than it went." The favorite target of critics has been the L-head V-12 engine, which has been variously termed fussy, inefficient, and difficult to work on. More about this in a moment.

History. The origins of any cult tend to accumulate folklore; and the circumstances surrounding the Continental's beginnings, which were in a sense accidental, have enhanced this. The following, based on diggings in the Ford Archives, are the facts:

The creator of the Continental was Edsel Ford, a complicated, quiet, and subtle man of excellent taste. Although nominally president of the Ford Motor Company, he was overshadowed by his strong-willed father. Styling was one field in which he could express himself.

In 1937 he returned from a European trip with some ideas for a personal car

The boxier shape of the postwar models added a formal and ceremonious dignity to the car.



he wanted. He sketched out a cabriolet with two seats for three, an automatic folding top, a top-hatched trunk, and a bare spare clapped upright to the back of the trunk. It would have space for golf bags or picnic hampers; it would look low, long and clean.

Edsel turned his sketches over to Lincoln styling chief Bob Gregory and to body engineers Martin Regitsko and Henry Crecelius. For convenience, the four men adapted the designs to the 1937 Lincoln-Zephyr chassis. Edsel Ford overruled a plan to tuck the spare inside.

Mock-ups were made and okayed, and paneling was hand-formed on wooden blocks. The windshield frame and some other parts were aluminum castings. The car was 209 inches long on a 125-inch wheelbase, and 62 inches high. It used the Zephyr's 110-hp. V-12.

Not for sale. Neither this first car nor the three or four that followed it were intended for commercial production. The first was a test car; the second went to Edsel Ford for his own use; and he ordered a pair more for his older sons Henry II and Benson. But during a Florida trip in the car, Edsel received nearly 200 serious requests for a "car like that." He returned impressed by the prestige it could contribute to the company.

Five more handmade cabriolets were made in 1938. In those early days, even the car's name wasn't certain. "Lincoln-Zephyr Continental" and "Continental Sportscar" were candidates. Twenty-five were built in 1939; in 1940 production went to 935, almost half of them a new hardtop version.

Boxier lines. Next year 963 cars were built, but in the following model year (1942) only 65 were made before the war cut off production, so that '42s are among the rarest of all. They introduced the boxier fender and hood lines that were to come on the postwar models (and that were to spill endless debate among the fans as to whether the original boat-hull or newer formal lines were the more pleasing).

After the war the production peak was in 1947 (1,569). The car was discontinued in March, 1948. Even though the last coupes sold for $4,600, the company reportedly lost $600 on each car. Prewar prices had not been so high; the earliest coupes had gone for $2,640.

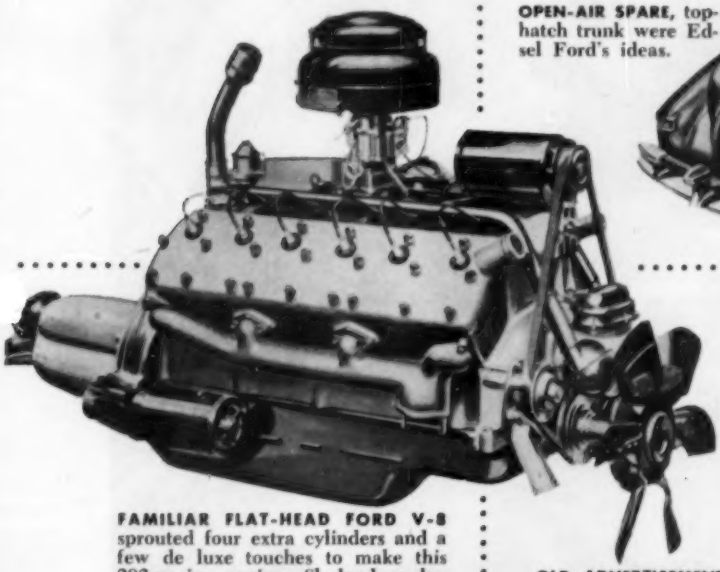
Zephyr parent. If Edsel Ford's personal preferences were a father of the Continental, the Zephyr was certainly the mother. It was the car behind the car. Also nurtured by Edsel, the Zephyr began in the early Thirties as an experimental car called the Sterkenburg. It was a rear-engined, chassisless car designed by John Tjaarda, a Briggs Body engineer. Edsel Ford first saw it in 1932, and took it over for development as a possible low-price car.

Its futuristic streamlining was retained, as was the unitized body, but the rear-mounted Ford V-8 engine was hauled up front when studies indicated that rear mounting would run the costs way up. The Zephyr turned out to be expensive enough as it was. When it was marketable in the fall of 1935, Lincoln had to scrap the low-priced idea, peg the car in the medium bracket, and power it with a new L-head V-12 to make it attractive at the necessary price.

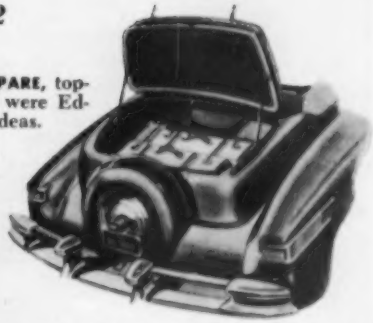
It was this same engine, slightly modi-

Proud owners drove hundreds of miles to first national rally

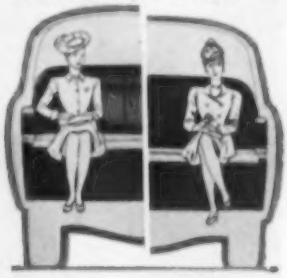
Though quaint today, this heavy old V-12 was a wonder mill in the Thirties



FAMILIAR FLAT-HEAD FORD V-8 sprouted four extra cylinders and a few de luxe touches to make this 292-cu.-in. engine. Sludged-up hydraulic lifters were one headache.



OPEN-AIR SPARE, top-hatch trunk were Edsel Ford's ideas.



OLD ADVERTISEMENTS plugged hard at theme that lowness wasn't bought at the cost of headroom inside.

fied, that twirled the Continental's drive shaft from 1937 to 1948. Its power rating, at 3,600 revs, ranged from 110 hp. on the first cars to 130 in '42, and back at 120 in 1946.

Today most Continentalists divide into two camps. One defends the V-12 as a much-maligned power plant, and the other proclaims it the Achilles heel of a fine car. Lincoln itself concedes that it was scrapped in 1948 as competitively disadvantaged—costly to make and troublesome to service.

Similar opinion comes from Orland W. Wilcox, of Altadena, Calif., the technical chairman of the Lincoln Continental Owners Club. His records indicate that about a third of the current owner-members have replaced the original engine, using Mercury, Lincoln, Cadillac and other V-8s. But those who have kept the V-12 are very fond of it. They contend that, when operating properly, it is "as smooth as glass" or "a delight to drive." Curiously, the greatest troubles seem to plague owners who baby the old mill by changing oil repeatedly and not

[*Continued on page 212*]

TORQUE-TUBE DRIVE and transverse rear spring were basically similar to Ford's, though more luxuriously designed. The ride and handling, superb in their day, are still pretty fair.

Air Force Huffs and Puffs to Blow Up Galeproof Shelter

ARCHED columns of air alone hold up this USAF arctic shelter, which can stand up under 80-m.p.h. winds or 24-ton loads of snow. The rubber tubing and 18 inches of air are all that separate radarmen from weather that often hits 65 below zero, but the shelter stays comfortable inside. Goodrich says it can be puffed up in two hours.

Flare Gun Sends Up A Burning SOS Every Eight Minutes

WITH a new rocket firer (right), a ship in distress can send out a continuous call for help without detailing a seaman for the job. Powered by the ship's movement, a turntable holding 96 flare shells sends up a ball of fire every eight minutes for almost 13 hours. The automatic SOS was demonstrated on a Dutch vessel.

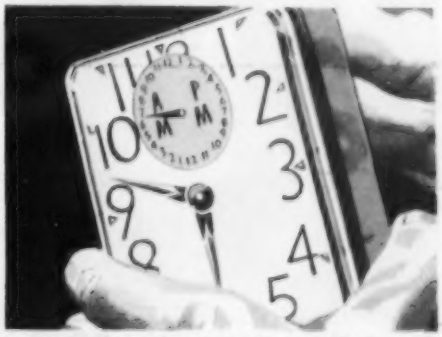
I'd Like to see them make...

A PLUG-IN MOSQUITO REPELLER that would fit into a car's cigarette-lighter socket to keep pests away from open windows, especially at drive-in theaters.—*William Zeff, Pittsburgh.*

EDIBLE ICE-CREAM DISHES made of the same pastry as ice-cream cones so they could be eaten when emptied, leaving no dishes to be washed. —*Arthur T. Iberg, Marine, Ill.*

A NONSLIP SCREWDRIVER with a sliding tubular guard over the shank to keep the tip of the screwdriver from sliding off the screw head.—*Harry Morris, Indianapolis.*

HANDLES ON BOTTLE CAPS like "ears" extending from either side. Then you could twirl off a screw cap as you would spin off a wing nut. —*Lawrence Lewandowski, Milwaukee.*



A 24-HOUR ALARM CLOCK that could be permanently set to ring once daily. A seven-day wheel with screw-in pegs could cancel alarm on holidays.—*J. H. Fulton, Inglewood, Calif.*

Everyone has his own pet idea of a gadget that he would like to see in general use. The five illustrated above were suggested by POPULAR SCIENCE MONTHLY readers. What is *yours?* We will pay $5 for each one published. Please use Government postcards only. Write name and address clearly. Contributions cannot be acknowledged or returned.

Russian Volga for '56 Will Have an Automatic Gearshift

AN AUTOMATIC gearshift that "picks its own gear according to gradient and speed" is featured in this 75-hp. Russian Volga. The car has an 80-m.p.h. cruising speed, Moscow says, and convection windshield defrosting (like U.S. cars). It will go into mass production in 1956. No price was mentioned in Moscow's radio announcement.

Shock Tube Tests Blast Effect

EXPLODING gases wham down this shock tube to "bomb" scale model buildings for the Air Force. As the shock waves travel the tube's 150 feet, their force against the models is recorded electronically. The Armour Research Foundation built the blaster.

New Bed Has Built-In Plumbing

PRESS a button on this hospital bed and a basin with running water appears from underneath. Another button makes part of the bed slide away and raises a water closet. Both fixtures have sewer connections. Dr. Marvel Beem, Los Angeles, is the inventor.

10-Year Test Proves Fluoride Saves Teeth

Children of Newburgh, N. Y., exhibit sound teeth after years of drinking fluoridated water.

Decay cut 50 percent without harm to health, doctors find, in experiment by twin cities.

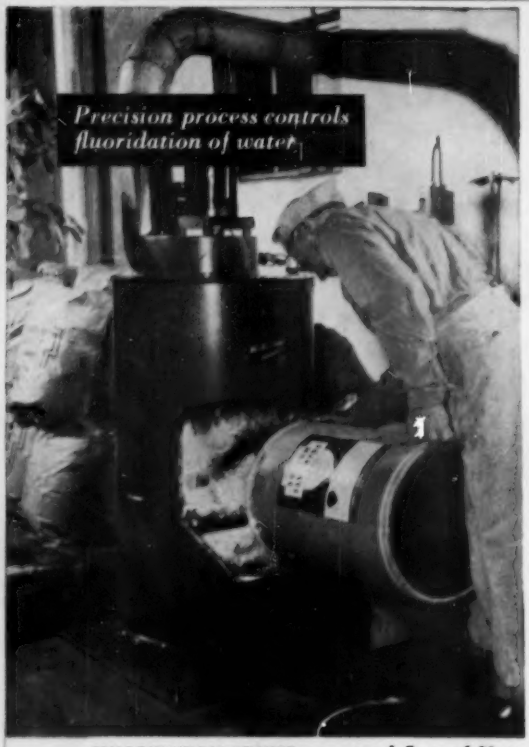
By Herbert Yahraes

ONE bright May morning 10 years ago a man in Newburgh, N. Y., started a historic experiment by pressing a switch in the community's filtration plant—a factory for turning raw water, as water-plant people call it, into drinking water.

As the switch was pressed, a motor hummed and two small rollers encased in a small black box began revolving. They worked like a miniature wringing machine but they squeezed out, instead of clothes, a tiny quantity of a white substance that looked like powdered sugar. It was sodium fluoride, a chemical that had been best known up to then as a rat poison.

State and local officials, watching, felt good. They had excellent reasons for believing that this stuff dropping into the city's drinking water would greatly reduce tooth decay in their community without harming anyone in the slightest.

Health authorities say that tooth decay, which they call dental caries, is our most prevalent ailment. It affects 95 percent of us. Largely in the hope of preventing it, we spend more than $200,000,000 a year on tooth pastes and powders, toothbrushes and mouth washes;



FLUORIDATION STARTS on second floor of Newburgh's plant when sodium fluoride is dumped into container (above). Note lemon tree, far left, which lives on fluoridated water. Chemical drops through rotary gate (below) into hopper, and is weighed. Then a roller feeds 3¼ pounds hourly into a dissolving pot. This processes 4,000,000 gallons of water.

yet the cavities appear faster than dentists can fill them. The present backlog has been estimated at an average of four for everybody, including babies and great grandpas.

The officials at Newburgh that May morning thought they had a big part of the answer, and the officials of hundreds of other communities have since then agreed. Newburgh children today have less than half the amount of tooth decay that occurs in the kids of neighboring Kingston who, for these 10 years, have been drinking unfluoridated water.

But if you suggested that your town should add sodium fluoride, or any other fluoride, to the water, some of your fellow citizens might take issue vehemently.

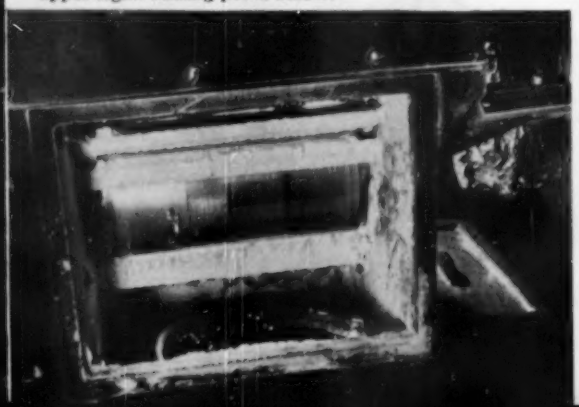
Bitterly controversial. Fluoridation, as the process of adding fluoride is known, has become one of the bitterest controversies in public-health history.

Among the opponents of fluoridation are persons who are intelligent, reputable, well balanced and at least fairly well informed. Other opponents seem to lack at least one of these characteristics.

An Ohio dentist, often quoted by the antis, turned out to be opposed not only to fluoridation but also to vaccination and pasteurization. He is opposed as well to cooking in aluminum utensils—it causes cancer, he says (without, of course, any scientific evidence). He received his license back in the days when it was possible to become a dentist without having gone to dental school.

A Los Angeles man who claimed to be

RATE OF FLOW through roller, shown in close-up with housing removed, is fixed by position of bar, with knurled handle, behind metal ruler at upper right. Mixing pot is below.



a chemist and used the title of "doctor" spoke vehemently in several states against fluoridation, which he called "pure insanity." A newspaper disclosed that he had escaped some years before from a state hospital for mentally ill.

A "Citizens Medical Reference Bureau," which has been fighting vaccination for years, now fights fluoridation too.

Sometimes opponents get intensely worked up. In a California community they passed out bottles labeled *Poison.* At a Congressional hearing last year in Washington, where the water is fluoridated, some of the witnesses carted around gallon jugs as evidence that they weren't stupid enough to drink the capital's water.

The experience with fluoridation in Newburgh has been a sort of capsule example of the nationwide battle over the process.

Twin towns tested. The New York State Department of Health had decided to run a controlled experiment. One town would be asked to fluoridate its water, while a neighboring town of the same size would be asked to keep its supply unchanged. Newburgh and Kingston—which lie only 30 miles from each other along the Hudson, each with about 35,000 residents—agreed to become the subjects, and the state picked Newburgh to be "it."

Hardly had the city council—sitting as the board of health—agreed to fluoridate before the complaints began pouring in. Dozens of people told jovial John Kingsley, chemist and water-department superintendent, that the new stuff was making the water taste terrible. A bottling works complained that the fluoride was putting such a fizz into its soft drink that half the contents of a bottle spouted out before it ever reached the capping machine. A company that treated felt, for hats, informed Kingsley that the new ingredient in Newburgh's water was ruining its dyeing process.

RACK OF TEST TUBES, used to double-check fluoridation, is held by Water Superintendent Kingsley. At start of experiment he had to listen to some pretty ridiculous complaints.

Actually, nothing had been done to the water—yet.

Plants get tryout. Later, among the visitors to the Newburgh water works was a group of garden-club ladies. They were not worried about what fluoridated water might do to them, but they did want to know if it would harm their plants. For answer, the superintendent pointed to a lemon tree growing in an ancient beer barrel only a few feet from the sodium fluoride hopper. It was watered from the fluoridated supply and it was obviously flourishing. It still is.

To find out whether fluoridation had any bad effects on the body as a whole, Dr. David E. Overton, a pediatrician with the state health department, has carefully followed 1,000 children, half from Newburgh, half from Kingston. At the start of the demonstration, they ran

HOURLY CHECKS are made on amount of fluoride added to water. If, by chance, roller were operated at capacity, only a harmless 240 pounds could get into water in 24 hours.

PHYSICAL EXAMINATIONS to determine what, if any, effects fluoridation was having on general health of city's children were conducted periodically for a decade. No harmful effects were found. At left, above, pediatrician takes blood count on a youngster, and at right a knee joint is X-rayed to find out whether the child's bone growth is normal.

in age from infancy through nine years. Every year they have had complete physical examinations and their bones have been studied by X ray.

After 10 years, Dr. Overton sums up his findings like this: "There are no significant differences between the two groups of children whatever. The Newburgh children, of course, have far better teeth. Outside of that, the addition of fluoride to the drinking water has had no effect at all."

Hearing in Congress. But, says the opposition, 10 years isn't long enough. It makes much of a report in 1952 by a House of Representatives group known as the Delaney Committee. This committee heard testimony favoring fluoridation from such organizations as the American Medical Association, the American Dental Association, the U. S. Public Health Service, the American Public Health Association, the Association of State and Territorial Health Officers and the National Research Council. But the committee also heard testimony from a few witnesses who felt that not enough of the returns were in. Its report recommended that communities use caution.

"The impression given is that we should keep on looking until we find a toxic effect," commented one authority, Dr. David B. Ast. "If we find one, then fluoridation is contra-indicated. If we don't, then we better keep looking." Dr. Ast, director of the Bureau of Dental Health, New York State Department of Health, is the man who flipped the switch at Newburgh 10 years ago.

The Illinois State Department of Health, studying the results in other communities, found that presence of fluorides made no significant difference in the death rate—either in the general death rate or in the rate from specific ailments such as heart disease, cancer, diabetes and nephritis, or kidney disease.

Some communities in the Southwest, without endangering health, have used water containing many times as much fluoride as Newburgh's. Public-health scientists studied one group of people in Bartlett, Tex., and another in nearby Cameron. Bartlett's water had a lot of fluoride—eight times as much as the recommended amount. Cameron's supply had little.

The findings? People born and raised in Bartlett had mottled teeth—which was natural because of the unusually high amount of fluoride. But the rates of disease, broken bones and death were just about the same in one community as in the other.

Some people retort that the water in towns like Bartlett was naturally fluoridated, and the "natural" fluoride ion, they assert, is different from the "artificial" one. Chemists reply that there isn't any "artificial" ion. Fluoride ions are fluoride ions, no matter how they get in.

All the temper over fluoridation has its origin back in 1908 when the new-

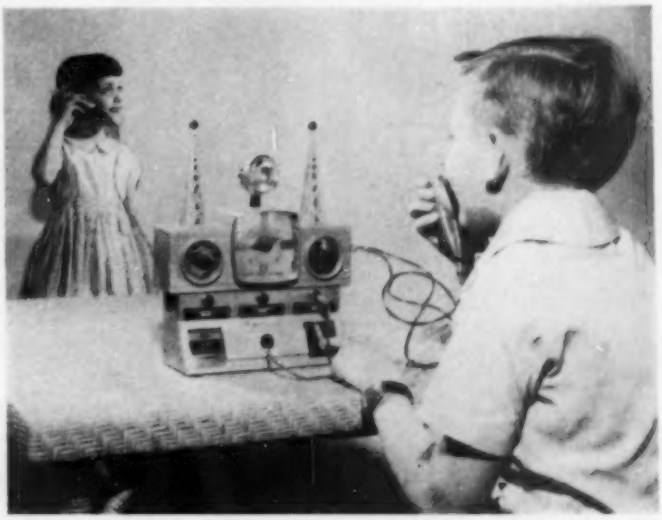
[*Continued on page 224*]

Free-Floating Underwater Camera Has Its Own Diving Lung

HERE's how movie men got underwater shots for "Jupiter's Darling." The camera was housed in a 510-pound casing made buoyant by air from the same sort of diving lung worn by the cameramen. By shifting waterproof stabilizing tubes, the men angled the camera as desired. A motor-driven propeller and rudder helped move the rig.

Small Fry Go On "Air" with Two-Tot Radio

THIS youngster is broadcasting over a toy radio station that can send and receive voice or code over a distance of half a mile. The tiny station has a rotating signal searchlight, an automatic decoder, and two mikes that can be operated independently as walkie-talkie field phones. Remco Industries, Inc., Newark 7, N. J., makes it.



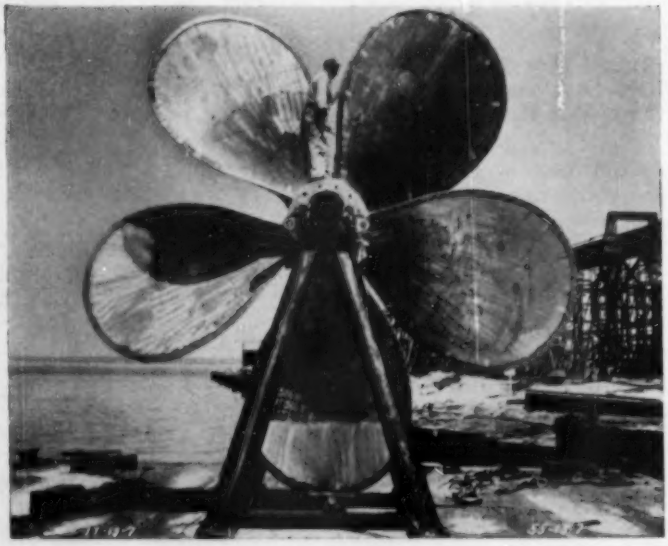
Army Carrier 'Swallows Up' Bumps

SOLDIERS who ride in this huge new experimental cargo and personnel carrier may doze undisturbed, even though the strange vehicle has no springs. Instead, it rides on eight giant air pillows, inflated to only three to five pounds of pressure. These absorb travel shock by "swallowing up" surface irregularities. The "Teracruzer," 25 feet long and 12 feet wide, was designed and built by the Four Wheel Drive Auto Co. of Chicago.

Giant Propeller Ready for Full Steam Ahead

THE workman at right is examining 70,000 pounds of cast manganese-bronze propeller, one of four that will drive the Navy's supercarrier, *Forrestal*.

The props, made by Baldwin-Lima-Hamilton, measure 21 feet across—so large that they couldn't be shipped by rail or over the road, but had to be barged from Philadelphia to Newport News.



MECHANICS *and* HOMEBUILDING

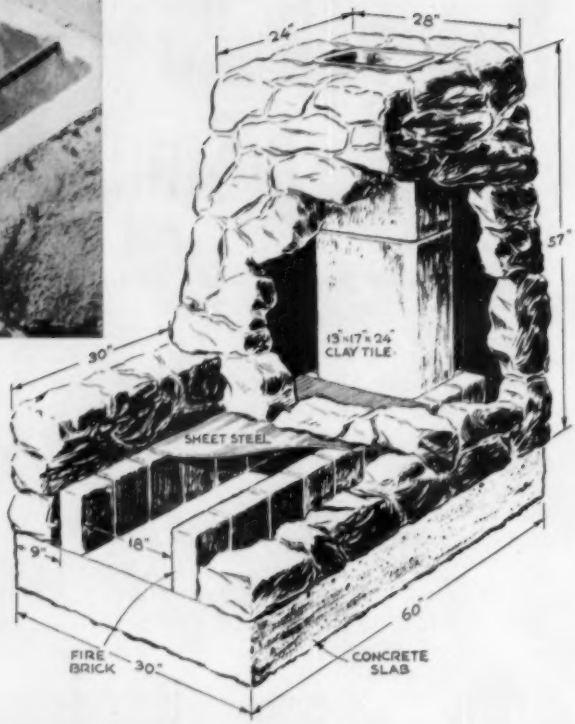
How to Build a Smoke Oven

You're missing a lot of fine eating if you haven't yet tried this popular type of back-yard cooking.

By Jerry Parker

SMOKE cooking gives a unique flavor and tang to steaks, fish, chicken—anything you like to cook outdoors. Hot, fragrant smoke roasts and colors food beautifully. Without smacking my lips too much about it, I'll just say that smoke cooking produces the best stuff I've ever tasted.

There's only one drawback to a smoke oven. It attracts the neighbors, children



You can cook in the oven or on the grill

COMBINATION BARBECUE has grill in front and smoke oven in back. To cook in the chimney, meat is hung on hooks from ⅜" concrete-reinforcing rods. Chip out pockets in top edge of flue to hold the rods loosely so you can remove them to insert large cuts of meat. Foods that can't be hooked can be laid flat on a grill hung on heavy wire hooks from the rods.

and dogs from all around. But we don't really mind—the food is so darn good we want to share it.

Smoke cooking should not be confused with ordinary smoking of meat, which is a slow curing process.

Cooking with smoke is an offshoot of barbecuing and can easily be combined with it. The one principle to remember is that fire should never touch the food. Flame frequently gives meat a charred, bitter taste, but smoke flavors it delightfully.

In a smoke oven the meat should be three or four feet away from the fire. It's also better if the meat doesn't hang right over the fire, for the drippings sometimes taint the smoke. Most smoke ovens are built with the firebox to one side of the chimney, which is the smoke oven itself.

Combination ovens cook both ways. If you don't have a barbecue or smoke oven, then it's probably best to build a combination unit, as we did.

If you already have a barbecue, you can undoubtedly do some smoke cooking by hanging meat in the chimney. Increase the height of the chimney, however, if the food isn't far enough from the fire.

But don't let me stop you from building just a smoke oven if you want to. A fellow who is handy should be able to make one out of stovepipe and sheet metal. I've also seen a masonry smoke oven built around steel pipe and using old brick which cost something like five dollars.

Go ahead and design your own unit and be a smoke-oven pioneer. You won't be hampered by any hard-and-fast rules. Just remember—the chimney of any smoke oven ought to be around four feet high.

The firebox in our unit is big because we cook simultaneously on the grill and in the oven, and it's handy to be able to stick long oak branches in the firebox. But you don't need a big blaze—just

plenty of hot, sweet smoke up the flue.

Materials are cheap. If you want to build something like our barbecue-smoke oven and have some field stone to play with, you might do it for even less than the $25 ours cost us. Our unit may be a bit overly elaborate—we like to play it safe.

For instance, although I lined the firebox with firebrick, perhaps that isn't necessary. At least one sidewalk superintendent has told me so. But the bricks make a handy shelf for the grill and flue tiles.

If you can scrounge a piece of scrap metal for your grill, you may get off better than we did. I scouted the county dump, thinking I might find the top of an old iron stove. An open grate could not be used because it wouldn't channel the smoke into the oven.

Finally, I purchased a piece of ⅛" steel 18"-by-36" from a blacksmith for five dollars. The steel serves as our grill and also makes a shelf for the rock courses at the front of the chimney.

The itemized cost of our barbecue-smoke oven came out like this: firebrick, $4.25; two 13"-by-17" clay chimney-flue tiles, $8; steel grill, $5; sand and cement, $7.75.

Construction is easy. I'm a ham mason and enjoy working with field stone because it doesn't take much skill,

Try smoke cooking this easy way

PLACE AN OLD BARREL, with the ends knocked out, over a fire built in a pit. A scrap of corrugated metal for a top will hold in the smoke and still allow some ventilation. If fire needs more, bore holes around the bottom of the barrel. Rod through top holds the meat.

Setting stones around a form makes the masonry job a cinch

CONCRETE SLAB is poured in frame of two-by-fours. It should be leveled up with stones where ground is uneven, but you don't have to bother with footings—it won't go anywhere.

FORM OF SCRAP WOOD spaces walls apart, gives you something to build against. Masonry is admittedly rough. The trick: lots of mortar. The result: a handsome rustic appearance.

yet the results are gratifying. Its rugged look conceals clumsy or impatient handiwork.

A form, no matter how crude, simplifies stonework. You merely pile stone against the form, fill in the gaps with small rocks and mortar—and keep on going up.

I try to keep the flat, good-looking faces of my rocks turned out. I make a good mortar bed for each stone, using a five-to-one mix of coarse sand and cement. Maybe I use more mortar than a pro, but what of it? It's easier, makes me feel safe, the mortar is relatively cheap, and the finished product looks good, to my wife and myself at least.

Cook it the way you like it. Smoke cooking offers a fine field for husband-wife culinary cooperation. My wife likes to concoct fancy sauces, but I'm strictly a meat-and-potatoes man myself, just learning the difference between a marinade and a mambo.

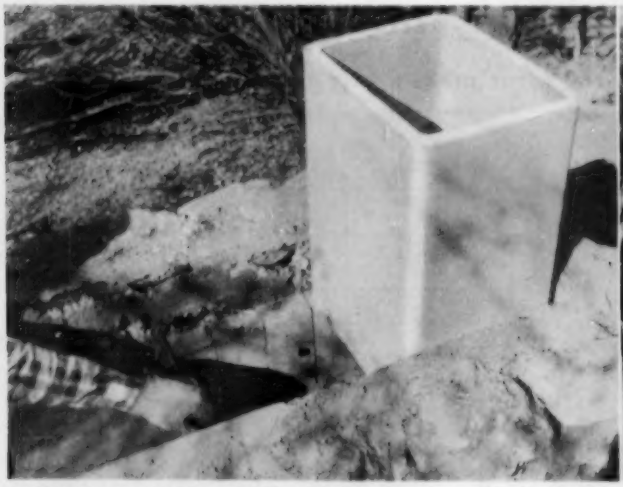
I put salt and pepper, butter, and sometimes garlic on my meat. And I yield to no one in my appreciation of smoke cooking.

There are no set rules for smoke cooking. This makes me happy because I don't like to run a barbecue on a time schedule. I can't relax that way. I like to pop the meat in the smoke oven, forget it, and eat when it's done.

WORLD-FAMED FOOD is cooked in these giant Chinese smoke ovens at Trader Vic's San Francisco restaurant. Your own modest oven can turn out food with the same delicious flavor.

Experimentation should be the order of the day in smoke cooking. Your smoke oven, unless it's an absolute replica of mine, will probably give different results. You'll have to test it and work out your own rules for its operation.

Our smoke-oven methods may be considered a little primitive by fussy epi-



WHEN SIDE WALLS ARE UP (above left), remove the wood form and start work on the chimney. Rows of firebrick, set in on end without mortar, line both walls, form ledges that hold the flue tiles in the rear and the metal grill sheet in front. The tiles themselves make a handy form when they are in place—just keep right on building up stones around them.

cures, but as long as I'm allowed to eat what comes out of it, I don't care.

Some smoke ovens have thermometers and made-to-order damper arrangements for the top of the chimney. Ours doesn't have a thermometer—they're not really necessary—and we keep the smoke in the chimney with a flat piece of scrap aluminum.

We have worked out a simple rod-and-hook arrangement for hanging our meat in the oven, and are planning a metal rig with a couple of removable shelves for cooking fish steaks. Such a rig could hang down from the top of the chimney on L-shaped hooks.

We're still learning about smoke cookery. I hesitate to mention any cooking times because you may not find them accurate in your oven. We can cook a small roast in a couple of hours, chicken parts in an hour and a half, weenies in 15 minutes. Fish steaks take about 45 minutes, whole chickens around three hours.

Firing it up. When you cork up the smoke in your chimney, a really intense heat is generated. A pair of asbestos gloves is an absolute must for pulling things out of the smoke oven.

And don't peek in when you raise the damper to get a look at what's cooking—let the smoke roll away a bit or you'll be suffocated.

Only hardwood or fruit wood—oak, alder, hickory, apple—should be used with a smoke oven. Never use pine, fir or any resinous wood—their smoke will ruin your food.

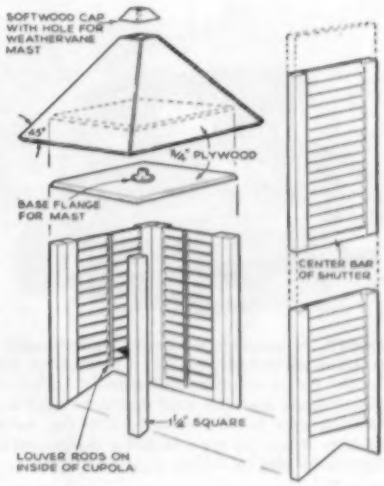
Green wood is an asset to a smoke oven for it gives more smoke. Charcoal is best for starting the fire and may be used for all your cooking. A low, steady fire will do the best cooking. We have burned lots of oak brush, leaves and all, in our smoke oven with mouth-watering results.

The grill in our barbecue-smoke oven enables us to cook a whole meal outdoors. While the meat is being smoke-cooked, we brew coffee on the grill or heat soup on it. We fry things—hamburgers, eggs, fish patties—right on the grill itself. END

A Colonial Cupola from Old Shutters

THERE's nothing like a cupola to break the monotony of a conventional roof line. A couple of discarded 66″ shutters provided the louvers for this one. Two sections were cut from each shutter and nailed to 1¾″-square corner posts.

To support a base flange for a weathervane mast, a square of ¾″ exterior plywood caps the assembly. Its edges also support the four plywood roof sections, which are topped with a block of white pine. Our cupola roof is covered with asphalt paper, but copper sheeting or shingles could be used.—*Robert S. Tracy, Beachwood, N. J.*



The Brights Refinish a Floor

By Henry B. Comstock

1

PENNY BRIGHT: "This floor looks like the south end of the Pan-American Highway. Suppose we could hire a bulldozer to backfill the dents and scratches?"

LES BRIGHT: "I'll do better than that for you. Hold everything while I call up Harry's Hardware Store."

4

HARRY: "Before we get around to the sanders, Les, are you sure your floors need sanding? Here are half a dozen good liquid and paste removers that will soften old paint, varnish or shellac so you can trowel it up with a scraper. They're easy to use and you'll be surprised at the natural beauty of the wood."

5

PENNY: "That sounds better to me than letting Les grind his way down to the basement with some infernal machine."

LES: "Remover might do in spots. But our floors need plastic surgery—not a facial."

HARRY: "Okay; here are the two sanders. Use the little one to work up to the moldings."

7

PENNY: "I suppose we could have bought floor seal for all our floors. But I'm sold on varnish for the living room and dinette."

LES: "We'll use the seal for our hard-worked halls. I can hardly wait to use the sanders."

PENNY: "Just be sure to keep them moving so they don't dig in. I hate rippled maple."

8

PENNY: "It says here: 'Start by removing all furniture from the room, opening the windows and closing all doors.' "

LES: "I'm way ahead of you. Uncle George always was allergic to sawdust."

PENNY: "What's this: 'Remove base moldings'?"

LES: "With an edge sander, we can forget it."

2

LES: "Hi, Harry. I need a floor sander, pal."
HARRY: "You mean *two* sanders, don't you?"
LES: "Nope! I want to rent a machine—not an armored division!"
HARRY: "Listen, Les. Something tells me you're out beyond your depth. Why not stop over and tell me all about your ailing floors?"

3

HARRY: "Glad you both decided to come. Too many of you do-it-yourselfers rush into a floor-refinishing job blindfolded."
PENNY: "I'll need a blindfold if something isn't done about ours in a hurry."
LES: "What's this two-sander deal? That's all I want to know."

6

LES: "Well, here we go. Two sanders, three grades of abrasive sheets and disks, a scraper, and plenty of liquid remover."
PENNY: "Not to mention an instruction book."
HARRY: "Wait a minute. What sort of finish will you put on your fancy new floors?"
PENNY: "Gosh, we hadn't given it a thought!"

HARRY: "There are three ways to make your floors 'come alive' and stay that way. For a fast job, two coats of shellac and waxing—"
PENNY: "Vetoed! Varnish holds up better."
HARRY: "Right. But before you make up your minds, let me tell you about an even more durable finish called floor seal."

9

LES: "All set with the coarse abrasive. I'll lower the sanding drum, slowly and—SAY, I SEE WHAT THEY MEAN ABOUT THIS BABY CUTTING FAST!"
PENNY: "DON'T FORGET TO LIFT THE DRUM WHEN YOU DRAW IT BACK FOR THE NEXT PASS."

10

LES: "Now, what was it you were saying?"
PENNY: "Not a thing. You handled that coarse sanding deal like an expert."
LES: "Did you see how I lapped each pass?"
PENNY: "Amazing! And the book says that the medium- and fine-sanding jobs will be easier."

[*Please turn the page*]

11

LES: "I feel more at home with this edge sander than I did with that big Patton tank."
PENNY: "This remover works like a charm."
LES: "One thing we can be thankful for. On old-fashioned floors they say you have to countersink the nails before you start. One nail can rip a sanding sheet to shreds."

12

LES: "Well, I can't say I'm sorry to see this part of the operation in the bag. I've heard that sanding is 90 percent of any floor-refinishing job."
PENNY: "Whoever said that didn't have to round up all the fine dust, afterward. While I'm at it, why don't you stir the varnish?"

13

LES: "Never stir varnish, Penny. Sloshing it around makes frothy bubbles that leave pockmarks in the finished surface."
PENNY: "Then how can you thin the first coat so it will work down into the wood?"
LES: "Easy does it. I add one part turps to eight parts varnish with slow paddle strokes."

14

HARRY: "Hi, folks. Thought I'd stop by on my way home to see how you're making out."
PENNY: "Les has one coat of varnish down."
LES: "I followed your instructions—flowed it on with long swipes in the direction of the wood, then brushed it across grain and finished with light, up-and-down strokes."

15

HARRY: "Your floor is practically surface-dry, now, thanks to the turps you added. But I'd wait a good 24 hours before sanding it lightly and applying the final coat."
LES: "That suits me fine!"
PENNY: "Don't get any ideas, big boy. Remember, we still have the hall floors to do."

16

LES: (next morning): "Applying floor seal with a mop sure beats that varnishing deal!"
PENNY: "Don't forget we have to mop up the surplus, wait 24 hours and then buff the floor with steel wool—not to mention a repeat performance 24 hours later. But who cares? We'll have the finest floors in town."

Remember These 10 Points When You Refinish a Floor

• ***Check the switch*** before you plug in the sander. If it isn't off, the drum may cut a valley into your floor.

• ***Protect the circuit*** which feeds the sander with a 20-amp. fuse. The sander motor may blow a 15-amp. fuse.

• ***Coarse sanding sheets and disks*** are for removing old finish. To cut bare wood use the medium and fine grades.

• ***Sanding dust is explosive.*** Empty the bag when it is a third full. Never leave dust in the bag overnight. Don't try to burn it. Keep it in a metal container until you can dispose of it.

• ***When using paste and liquid removers,*** let the remover—not the scraper—do the work. If forced against a semi-hard old finish, a scraper may dig in, mutilating the wood.

• ***Place remover sludge*** in a metal container. It is highly inflammable.

• ***Remove the plates*** from any electrical floor receptacles and cover the outlet boxes with masking tape before applying remover to surrounding areas. Sludge or liquid in an outlet box is an invitation for a visit from your fire company.

• ***Don't use filler*** before varnishing a maple or soft-wood floor. Varnish holds better when applied directly to close-grained woods. Use filler only on oak.

• ***Apply varnish in successive strips*** no more than two feet wide, running from wall to wall in the direction of the floor boards. This gives you time to brush the varnish into the grain and smooth the surface before it becomes too tacky.

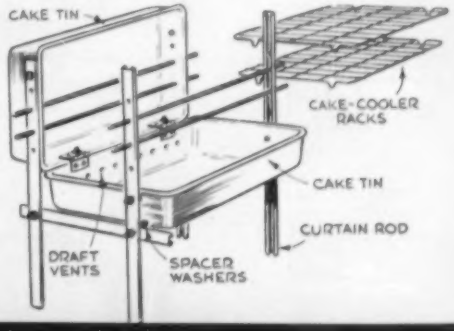
• ***Patience pays.*** In general, slow-drying finishes are the most durable.

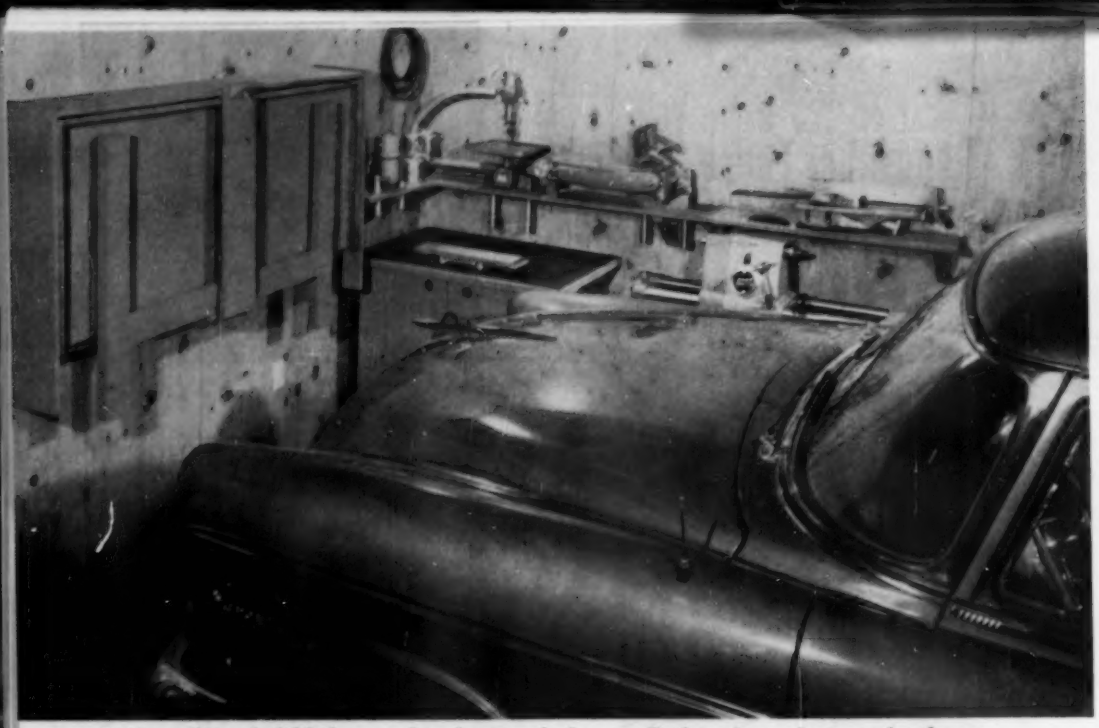
Dime-Store Parts Make Picnic Broiler

THIS charcoal broiler handles several small steaks at a time and does a good job of baking. It's made by joining two large cake tins with a pair of hinges.

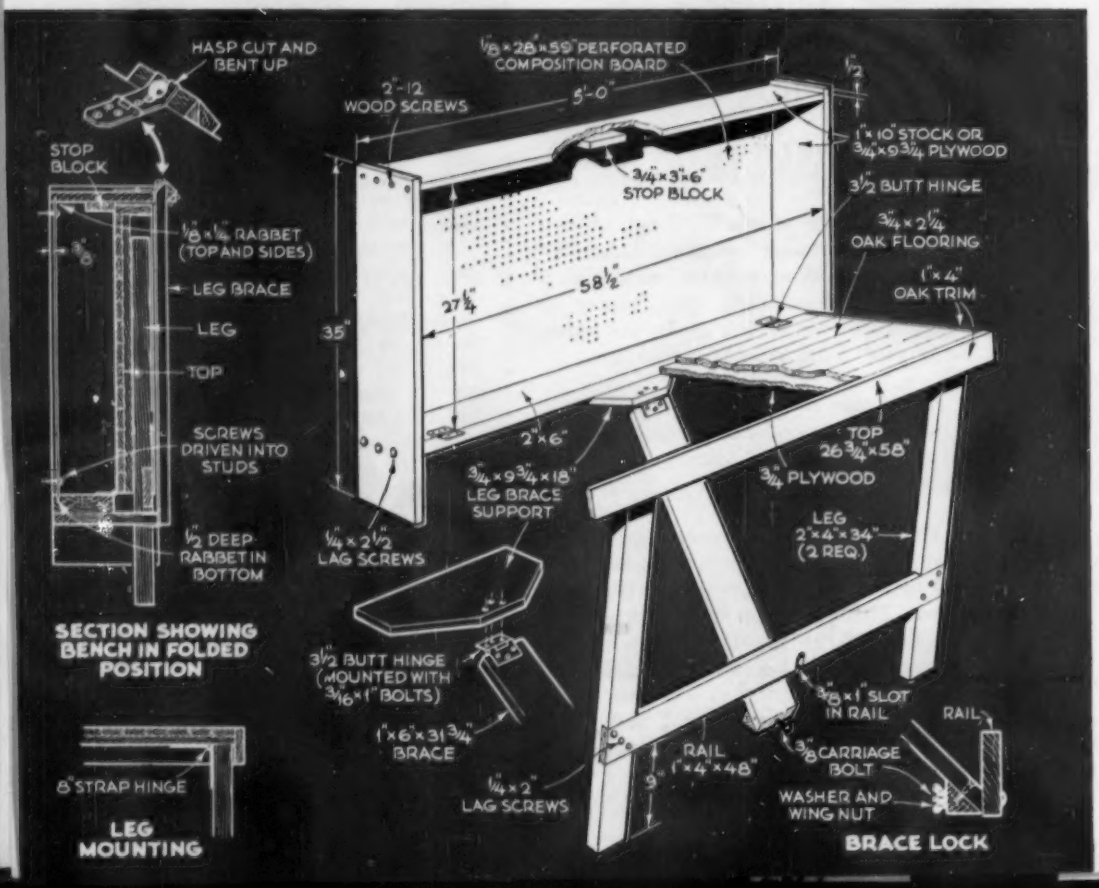
Use four 20″ lengths of flat curtain rod for legs. Bolt the front legs to the horizontal pan and the rear ones to the vertical pan near its top. Use a fifth curtain rod as a steadying brace.

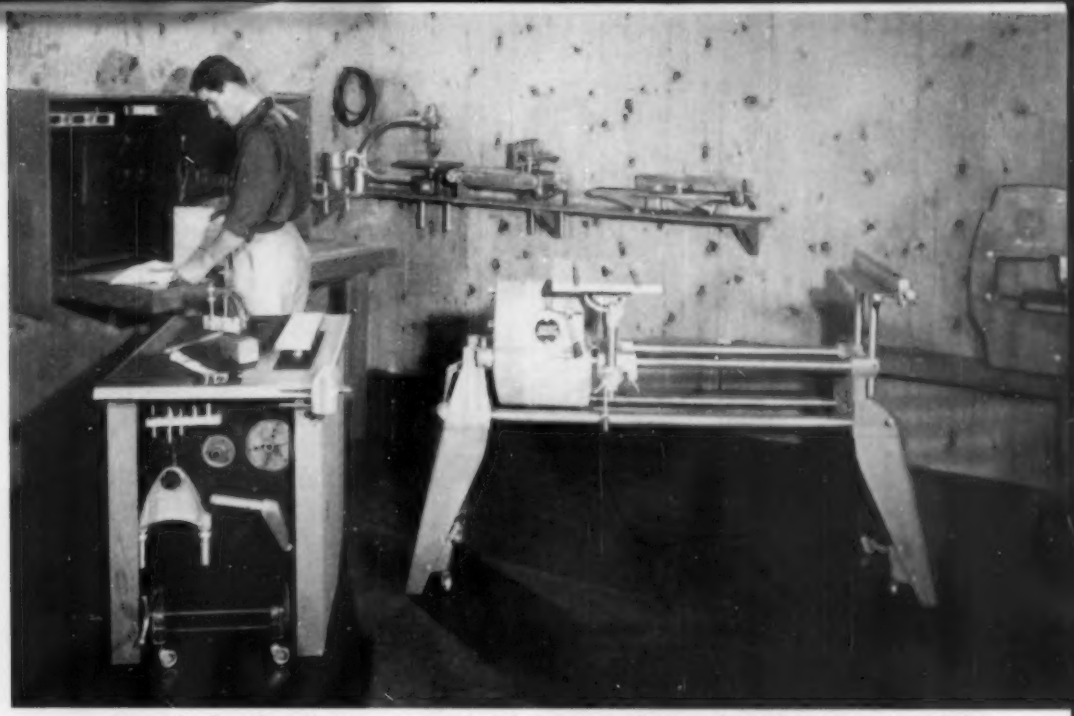
Lay a cake-cooler rack over the lower pan, hooking it over extensions on the hinge bolts. This rack is the charcoal grate. Holes drilled in the side of the lower pan just below the hinges provide draft. Use a second cake-cooler rack for the broiling grill. To make it adjustable, drill holes in the legs and the reflector pan at 4″, 6″ and 8″ heights above the grate. Slip 3/16″ rods through the holes to support the rack.—*K. D. Curtis, Hastings, Nebr.*





With workbench folded up and tools stowed along wall, there is ample space for the car.





Drop the bench, roll out power tool and accessory chest, and you have a man-sized shop.

No space in your home for power tools? You can find it by hanging

A Workshop on the Wall

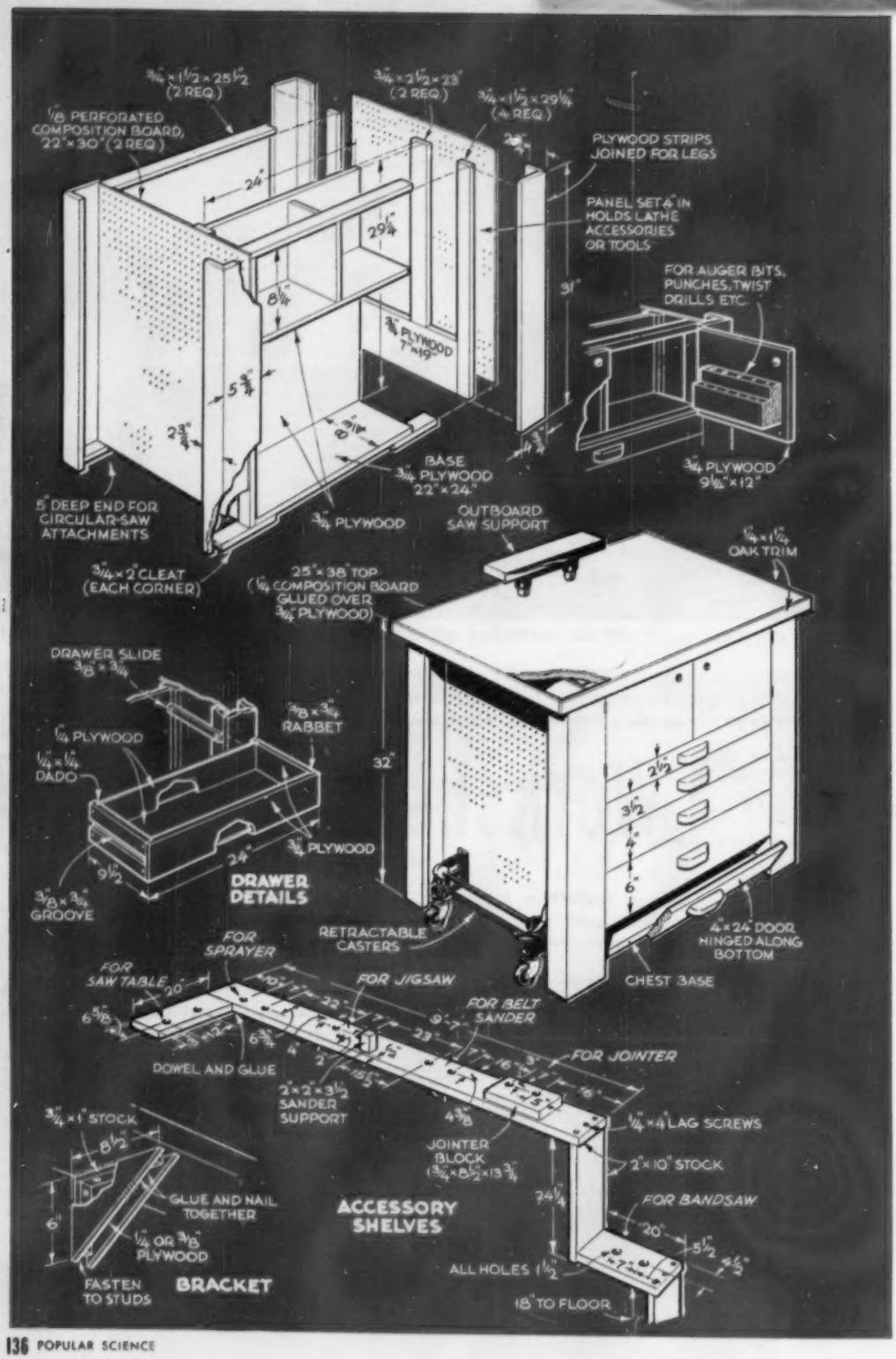
HERE is one workshop layout that won't elbow your car out of the garage or start a feud with your wife over basement laundry space. It's built around three ingenious workshop pieces:

- A workbench that folds up as the door of a roomy tool cabinet.
- A rolling accessory chest, doubling as an outboard support for long work.
- Wall-hugging shelves that hold heavy attachments where you can get them with least effort.

Accessory chest provides extra work top too.

These were designed by the Magna Engineering Corporation especially for use with Shopsmith equipment. Because of its shape and caster mounting, this combination tool can be stored under the shelves.

Folding workbench. A hardwood top almost 5′ long folds up into a wall cabinet. Inside this, there is a space 5″ deep for tools. When down, the top rests on


3/4" × 1 1/2 × 25 1/2" (2 REQ.)
1/8" PERFORATED COMPOSITION BOARD, 22" × 30" (2 REQ.)
3/4" × 2 1/2 × 23" (2 REQ.)
3/4" × 1 1/2 × 29 1/4" (4 REQ.)
PLYWOOD STRIPS JOINED FOR LEGS
PANEL SET 4" IN HOLDS LATHE ACCESSORIES OR TOOLS
FOR AUGER BITS, PUNCHES, TWIST DRILLS ETC.
3/4" PLYWOOD 9 1/2" × 12"
3/4" PLYWOOD 7" × 19"
BASE 3/4" PLYWOOD 22" × 24"
5" DEEP END FOR CIRCULAR-SAW ATTACHMENTS
3/4" PLYWOOD
OUTBOARD SAW SUPPORT
3/4" × 2" CLEAT (EACH CORNER)
25" × 38" TOP (1/4" COMPOSITION BOARD GLUED OVER 3/4" PLYWOOD)
1/4" × 1 1/4" OAK TRIM
DRAWER SLIDE 3/8" × 3/4"
3/8" × 3/4" RABBET
1/4" PLYWOOD
1/4" × 1/4" DADO
3/4" PLYWOOD
3/8" × 3/4" GROOVE
DRAWER DETAILS
RETRACTABLE CASTERS
4" × 24" DOOR HINGED ALONG BOTTOM
CHEST BASE
FOR SAW TABLE
FOR SPRAYER
FOR JIGSAW
FOR BELT SANDER
FOR JOINTER
DOWEL AND GLUE
2" × 2" × 3 1/2 SANDER SUPPORT
1/4" × 4" LAG SCREWS
JOINTER BLOCK (3 3/4" × 8 1/2" × 13 3/4")
2" × 10" STOCK
FOR BANDSAW
ALL HOLES 1 1/2"
18" TO FLOOR
3/4" × 1" STOCK
GLUE AND NAIL TOGETHER
1/4" OR 3/8" PLYWOOD
FASTEN TO STUDS
BRACKET
ACCESSORY SHELVES

two sturdy legs, locked by a single brace. The perforated panel, on which tools are held by preshaped hooks sold for the purpose, is set into grooves. Fasten the cabinet to the wall studs with its lower edges 29″ above the floor.

Cut the plywood underlay for the top to size; then glue and blind-nail oak flooring over it, and oak trim to the edges. Attach the top to the cabinet floor with three 3½″ butt hinges.

Hinge the legs to the underside of the top. Notch the bottom edge of the horizontal rail for the bolt, and screw a triangular hardwood block to the brace to provide a flat surface for the wing nut.

Cut a hasp across the end of its slot to form a forked end. Drill a hole in this leaf; then bolt it to the cabinet top. Bend the forked end up to match the end bevel on the brace when it's swung up.

Traveling tool chest. Besides keeping accessories and a handy extra work surface at your elbow, this is the right height for mounting the Shopsmith extension table as an outboard support.

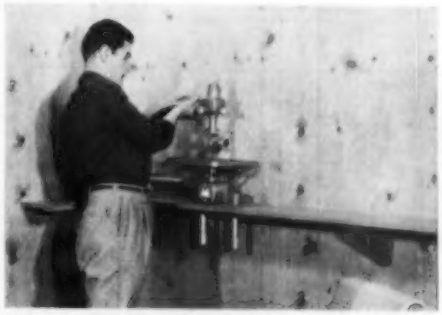
Build the frame around a plywood base and partition. Join a wide and a narrow piece to make each leg. The joint can be mitered and reinforced with glue blocks, cleats or angle brackets, or butted and screwed along the edges. Make two legs 4¾″ wide, two 5¾″ wide. Glue and screw them to the corners of the frame.

Fasten a plywood top to the frame; then glue on composition board and attach oak trim to the edges. Drawers and partitions can be added as shown.

Accessory shelves. These hold heavy tool attachments at convenient waist height. Use 2″-by-10″ lumber for strength, mounting it with steel angle brackets or homemade ones built up of plywood gussets and 1″ filler pieces as shown. To turn a corner, join the second shelf with edge dowels, or cleats. END

IF YOUR POWER TOOL TRAVELS, so should its accessory chest. Mounted on Shopsmith casters, this one goes along to the job. Accessories hang on the end panels. One side has drawers; the other, with two doors, can be fitted with shelves for sanding disks and vertical dividers for circular-saw blades. Holes in wall shelves fit Shopsmith attachments.

TOOL CHEST has mounting base for Shopsmith extension table bolted below its top. Height of this can be adjusted by inserting Allen wrench through 1½″ finger holes in the doors.

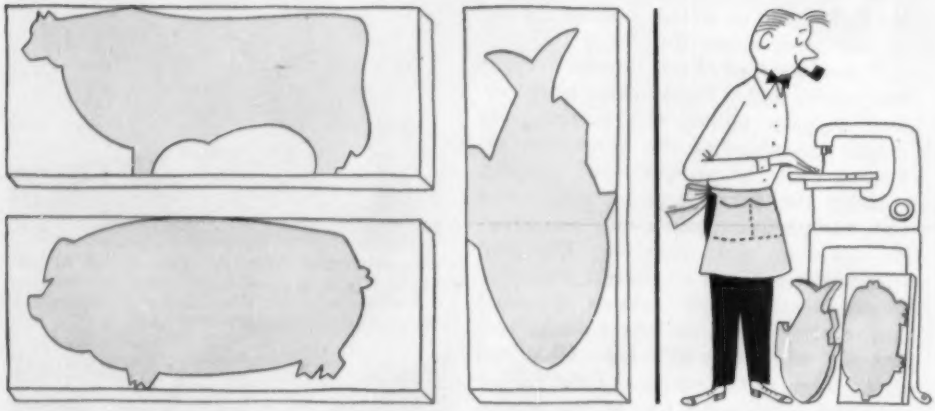


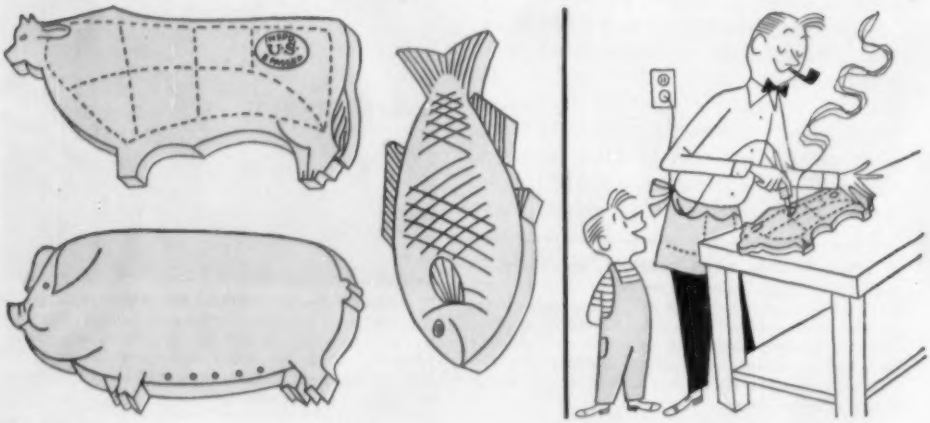
WALL-HUGGING SHELVES store major attachments. There is even space for a belt sander, to become available this fall, and a bandsaw to be announced some time next year.

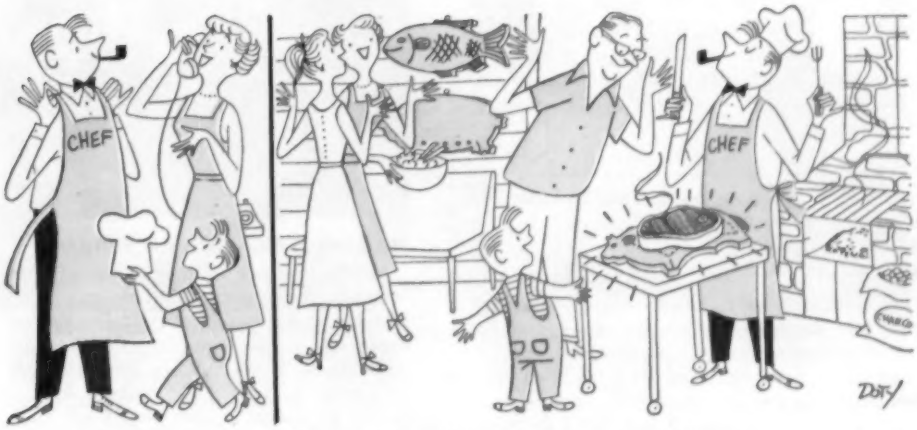
IT SPRAYS PAINT TOO. New Shopsmith compressor, a diaphragm type, can deliver 2½ cu. ft. per minute at 30 lb. pressure. Its price ($49.95) includes spray gun and hose. With 100′ of common garden hose added, it can even be used to paint your house.

By Roy Doty

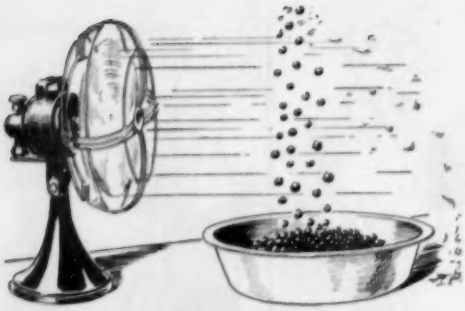
Wordless Workshop







Like a pattern of these cutting boards? Please turn the page



Fan Blows Leaves Out of Berries

BERRIES gathered in quantity are liable to contain leaves and small twigs because of the fast pace of the pickers. If you pour the berries into the stream of an electric fan, the debris will blow off and washing will be easier. The few berries that may be carried off by the breeze are quickly salvaged.—*D. H. Jones, Sault Ste. Marie, Canada.*

A Pattern Makes the Job Easier

"WORDLESS WORKSHOP" projects can be built by experienced craftsmen without further instructions. But if you're a beginner, you might appreciate full-scale patterns. So the editors have arranged with the McCall Corp. to supply them.

To secure full-size, iron-on patterns for the cutting boards on pages 138-39, send 60 cents (50 cents for patterns, 10 for handling charges) to Wordless Workshop, Dept. 755—112W, Popular Science Monthly, 353 Fourth Ave., New York 10, N. Y. (See PSM next month for another pattern.)

Wordless Workshop, Dept. 755—112W
Popular Science Monthly
353 Fourth Avenue
New York 10, N.Y.

Please send me full-scale transfer patterns for the cutting boards. I enclose sixty (60) cents.

NAME _____

STREET & NUMBER _____

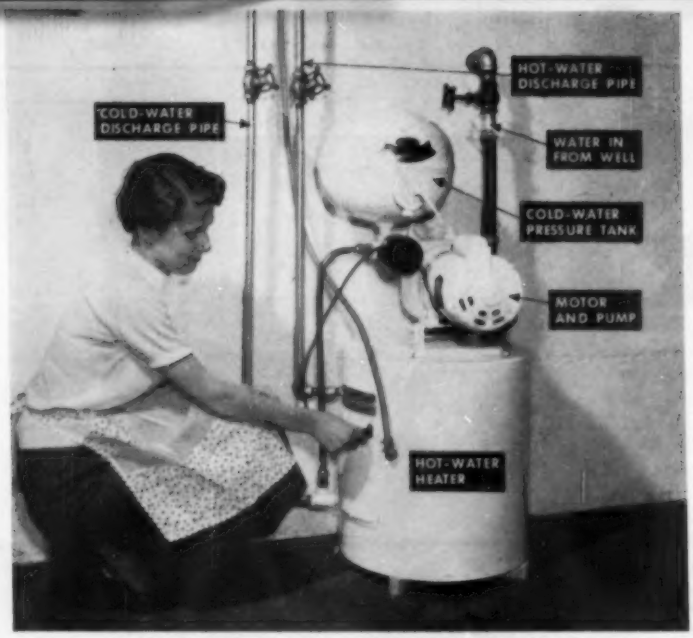
CITY & ZONE _____ STATE _____

Coat Hanger Holds Hat, Too

AN ORDINARY wall peg may not take both a hat and coat, but here is an easy solution. Drill on a slant for a nail that will hold a wood coat hanger, then screw a hook into the wood for a hat.

Nailing Trick Saves Fingers

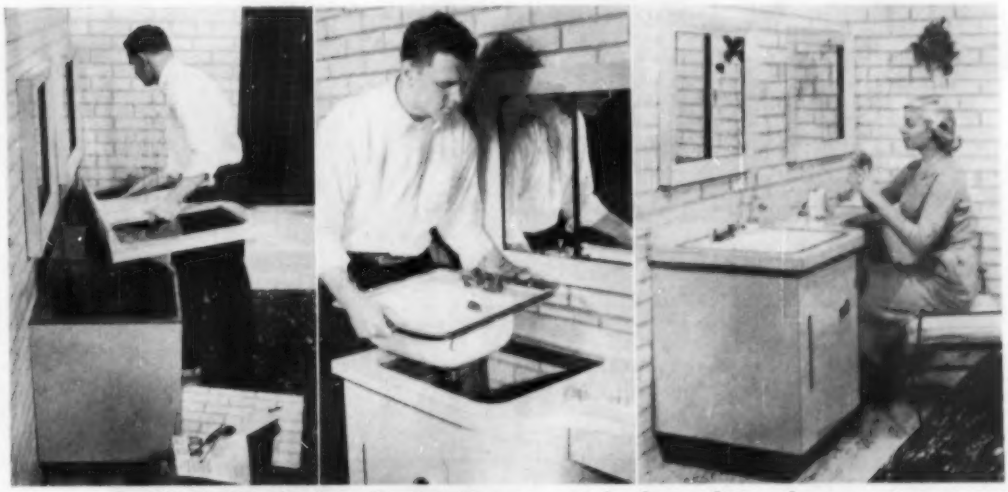
WHEN you use short nails, hold them between the index and middle fingers. One tap and a nail is ready to be driven home, and a miss won't hurt fleshy finger pads much. Extra nails in the palm roll into position. It's an old roofer's trick.—*Henry V. Lukas, Inglewood, Calif.*



New for the Handy Man

1. Tank Pumps Hot and Cold Water. You can have a complete hot-and-cold-water system by connecting this compact unit to a well or other source. The water heater operates on standard 110-volt AC current. It can deliver 12 gal. of 150° water at one time, or up to 30 gal. at bath temperature by mixing in cold water. A thermostat regulates the water temperature from 120° to 180°. The motor can pump water from a well as deep as 70′. Upright, the unit is 42″ high, but you can adjust it to fit under a sink by swinging pump and pressure tank down.

2. Tiny Camp Stove. With only ¼ pint of fuel, this brass camp stove will burn for two hours. It uses regular gasoline, and requires no priming to start. Equipped with a collapsible grill, it weighs one pound and fits into a 3½″-by-5¼″ container for easy packing in a knapsack.



3. Kit Builds Modern Vanity. You can install this modern bathroom vanity by just fitting the precut sections together. The kit combines a dressing table, twin sinks, storage cabinets and mirrored medicine chests. Only the medicine chests require recesses in the wall. Three different models from 27″ to 7′ long are available, with twin and single sinks. You can get the kit with or without bowl and fittings.

Please turn the page for more handy-man news

New for the Handy Man

(Continued)

4. Mower Guards Cord. There's no danger of cutting or tangling the power cord on this electric mower. An extension handle, which can be switched to either side, holds the cord nearly 2′ from the blade. At the end of each strip, you simply flip over the reversible handle, instead of turning the mower around, so the cord is always kept on the same side.

5. Siding Clips in Metal Strips. With these aluminum strips and grooved hardboard planks, you can put on siding without nailing through the boards. Each metal strip is nailed to sheathing over the top edge of one plank and supports the bottom edge of the plank above it, automatically producing a lap effect. Vent holes every 8″ allow moisture to escape, preventing rot and paint peeling. The ¼″-thick hardboard siding comes in 10″ and 12″ widths up to 12′ long. Joints at corners are closed by metal caps that snap on.

6. Screens Work Like Shades. You can have a screened-in porch by putting up aluminum tension screens that need no framing. Fitted into hooks at the top, the screen is rolled down and secured to catches along bottom. The screen comes in widths up to 6′ and any length. It can be rolled up and removed for storage. These screens also come in various sizes for many types of house windows.

Further information on the products shown on this and the preceding page can be obtained from: 1. Dayton Pump & Mfg. Co., 500 N. Webster, Dayton, Ohio; 2. Palley Supply Co., 2263 E. Vernon Ave., Los Angeles; 3. National Vanity Co., 163 Ave. A, Bayonne, N.J.; 4. Huffman Mfg. Co., 117 Gilbert Ave., Dayton, Ohio; 5. Masonite Corp., Box 777, Chicago; 6. Durall Products Co., 1420 6th St., York, Pa.

KEEPING THE Home SHIPSHAPE

AN ICE BUCKET for the patio can be made by wrapping a pail with plastic clothesline. Hide the ends at start and finish of spiral by overlapping. To complete the job bind the overlaps with strong linen cord.

HOUSE PAINTING goes faster if you pour the paint into a five-gallon can cut off so it can be hooked to the ladder. Shape the long end over a rung so the bottom of the can rests against the rung below.

BEDROOM SLIPPERS always missing? Keep them in part of a shoe bag fastened to your bed. Tuck it under the mattress so it hangs over the side board, or tack it to the rear of the board. An extra pocket will hold tissues or a flashlight.

HERE'S A BOX SEAT for picnics. It's an open-front plywood box hinged to a four-sided frame strung with webbing. Top member of woven lid is inset so webbing doesn't hit it. Foam rubber cushion fits inside box when closed.

Please turn the page for more home tips

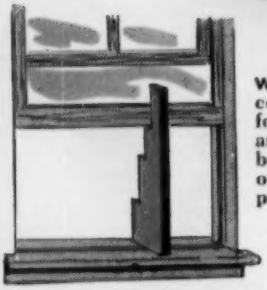
More Home Tips

A WATERING CAN with small leaks in the bottom can be sealed with asphaltum paint. The paint congeals before any appreciable amount flows out of the holes. After covering the bottom, keep can level until dry.

ALUMINUM AWNINGS with a modern look are easily bent to shape from light sheet stock. For stiffeners add plywood sidepieces and nail or screw these to the window frame. Drive a finishing nail or two also into the top of the awning through the siding.

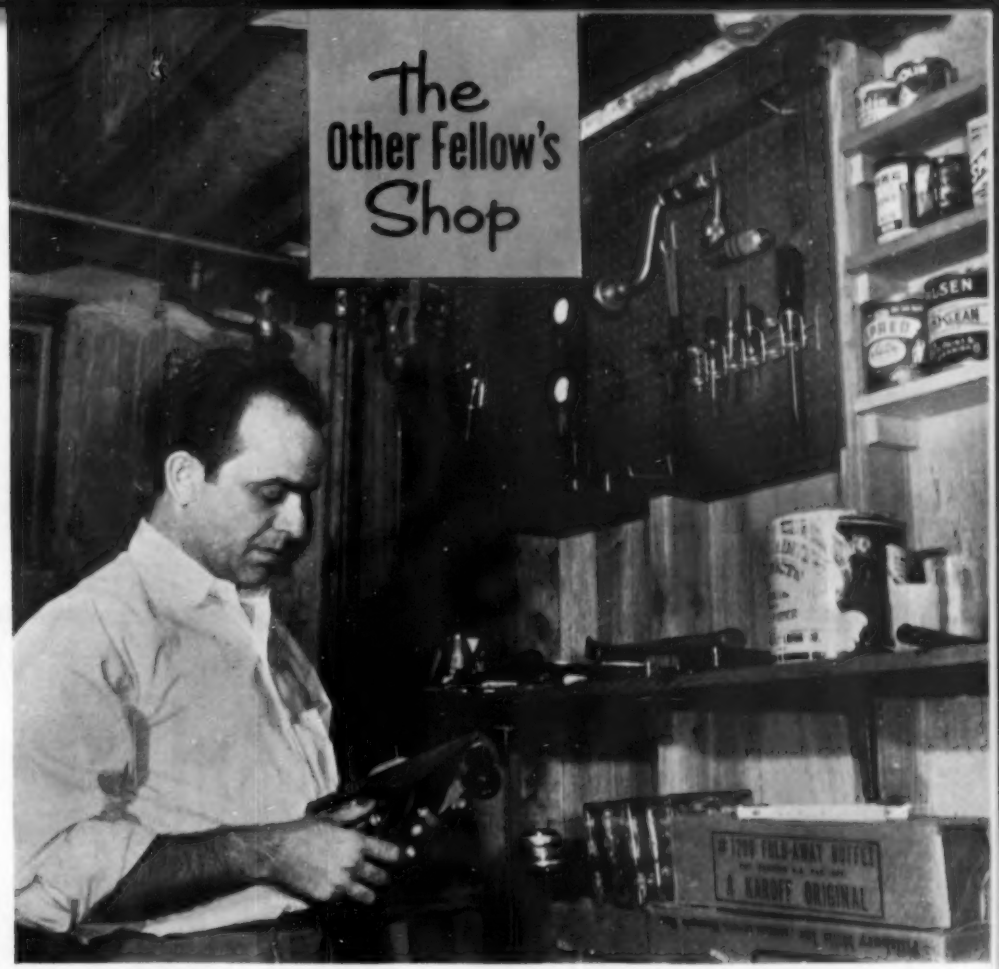
TO KEEP POTTED PLANTS WATERED while you're away on vacation, stand them on bricks in a leakproof container or a stationary tub and cover the bricks with water. The clay will absorb enough water to keep the roots moist for about two weeks.

SHOWER-BATH FANS will appreciate a second soap dish within their reach. Screw or cement it to the wall at a height that keeps it out of the direct spray from the shower head.



WINDOWS without counterweights, still found in old farmhouses and summer cabins, can be wedged open at various levels with a stepped prop like this one.

A BEACH BLANKET won't blow away while you're in the water if you weight it down with heavy L-shaped metal brackets. Sew them into corner pockets so they won't fall out every time the blanket shifts or when you fold it up to carry away at end of day.



He Makes Jokes in His Shop

Morrie Brickman, the handy man's cartoonist, makes doing-it-yourself funny as well as fun.

OF ALL the strange creations that come out of basement workshops, Morrie Brickman's probably win the chrome-plated dado cutters. He makes cartoons that prick-punch do-it-yourselfers where it tickles.

Brickman's caricatures of the handy man at work—you see a few examples on the following pages—now appear regularly in some 130 newspapers, including one Finnish. Many of the best have been gathered into a new book called *Do It*

Yourself, Or: My Neighbor Is an Idiot (Gilbert Press, New York).

Some of Brickman's cartoon ideas originate in his own shop, a modest layout equipped with hand tools, a borrowed table saw and a new set of nail-storage jars he installed so high up that he has to climb on a chair to reach them. But he gets most of his jokes by eavesdropping on neighbors and fellow commuters.

Fun to talk it over. "The biggest thing about do-it-yourself isn't doing it but talking about it with the guy next door and the guy at the next desk downtown," he finds. "And the biggest thing in talking about it is describing your stupid mistakes and making them sound more awful than the next guy's."

One recent story told on the 8:09 concerned an after-hours electrician who set out to plant a driveway coach lamp and post in the ungraded front yard of his half-finished house.

This is one of a series of articles about noteworthy home workshops. See POPULAR SCIENCE MONTHLY *next issue for a story on another fellow's shop.*

He picked a site, bought the fixture, assembled post and lamp, wired and set them up. That was one weekend.

The next weekend he dug a long conduit trench across the front yard and under the front porch site, snaked the wire through and left it sticking up near the future porch switch panel.

A few days later he decided to run out to the new place and see how work was progressing. He arrived to find the masons had poured his concrete porch floors that day, burying every sign of the cable and the trench.

Another tale Brickman chortles over devilishly is about the safety expert who decided to do his own spring painting. He got in lots of paint and slathered it over the whole house from footings to ridgepole. Came a warm evening, and he wanted to open some windows, but discovered he had painted all of them shut. So he grabbed one of the stuck sashes and tugged and tugged until finally it whammed up and kayoed him with a broken jaw.

. . . then going into the cement it was making funny sounds but I managed to finish all right. Sure appreciate your letting me use your drill.

Uh . . . Dear . . .

As critic-at-large of the nation's workshoppers, Brickman is naturally above all this. Of course, there was the time he and the missus were dandying up the new house for an important dinner party, and he installed the new dining-room pull-down lamp with so much cord it hung to within about 2½ feet of the floor and wouldn't wind back up. It worked out fine as a centerpiece, and anyway

Got anything you want welded, dear?

Did you hear something fall?

. . . then I said, "So if one-inch board is only ¾ inch, what size do I want if I REALLY want one inch?" And he said . . .

No wonder it didn't work, Dad — the switch was off!

they had intended eating by candlelight.

The biggest job on Brickman's shop work sheet right now is a new basement recreation room. It's a big assignment, but he's not perturbed.

His calm, simple approach to do-it-yourself is reflected in his simple tool layout and his dress. There's never any folderol about dungaree suits or twill shirts when Brickman tackles the shop. He keeps on the same outfit he wears at the office: razor-creased trousers, white shirt open at the collar, polished oxfords, and spiffy combed hair.

This same, well-ordered pattern carries through to his shop projects too. Just give him plenty of wide quarter round and baseboards, and he can make any job in the house look good.

He's paneling the recreation room in tongue-and-groove knotty-pine stock, building in cabinets, and leaving a large hole to back the family TV set into. A few feet away there will be a built-in love seat on which the neighborhood

children can sit—or jump up and down.

"This room is for the kids," Brickman explains. "I'm building everything sturdy."

At one end there will be a huge toy cabinet with pigeonhole compartments, each with its own color-coded door. On the ceiling will be acoustical tile to keep playtime din bottled up in the basement.

Brickman was a little worried for a while because his panel joints had a tendency to lean from the perpendicular, but he found that a good sharp plane applied to a tongue every few boards and a swift kick in the corners every so often fixed everything.

HANDY MAN-CARTOONIST Morrie Brickman, who makes his living by satirizing do-it-yourselfers, is doing-it-himself anyway. His current project is a pine-paneled recreation room.

The rest of the family likes to tiptoe into Brickman's layout occasionally. And Brickman enjoys nothing quite so much as taking a break from the drawing board and upcoming rec room to play a shop game they call Puzzle with Paul, 6, and Harriet, 7.

First, the youngsters, hiding their work from each other, decide on pictures, and each sketches his own idea on a plywood scrap, painting or coloring in the scenes with their colored pencils or crayons.

Then, still concealing their work, they go down to the shop, and Brickman saws up the pictures into jigsaw puzzles.

Finally, they trade pieces and try to put each other's pictures together.

"I like this game because it doesn't matter whether I can saw a straight line or not," Brickman explains quietly.

Until almost a year and a half ago the cartoonist had never gotten closer to tools than using a pair of pliers on a ketchup bottle. Then he built his ranch house, a slick suburban shack in Highland Park, Ill., near Chicago, and that started both the shop and the snide but realistic shop comics.

Brickman began his career in 1933 at the age of 17 with an art job on the staff of *Esquire* magazine. Today he is chief artist and head of the National Newspaper Syndicate, an organization existing solely to deal out his sketches of homey mayhem to all paying takers.

It's Brickman's contention that just the mere act of building a house did not sick him on the workshop set. Rather it was because, like most poor Joes with that mortgage itch, he got the house he wanted, not the one he could afford. The shop then became a necessity.

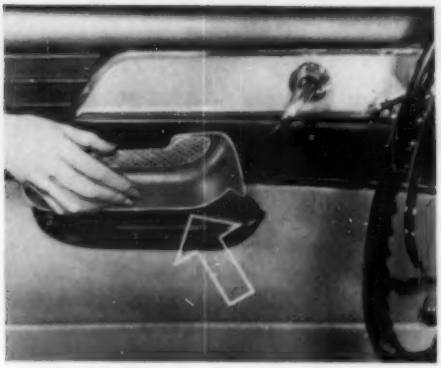
"If a man has $10,000, he buys a house that costs $12,000," Brickman reasons. "If he has $25,000, he buys a $30,000 place. It's the same with renting. He gets his place and hasn't a cent left for anything else. What can he do but fix up his own car, put together his own dining-room table, paint the walls, and keep at it until his back breaks? It isn't do-it-yourself; it's survival of the fittest."

It was this that decided Brickman to champion the do-it-yourselfer, the home workshopper, the poor, misunderstood guy who seems to spend a third of his time dadoing his fingers or tying his tendons in pretzels, a third being ridiculed and scolded for wasting materials, and a third bragging about his brilliant coups in craftsmanship.

"So you see," Brickman smiles, "when I call my neighbor an idiot, I don't do it maliciously. And anyway, he called me one first."—*Kenneth Wylie.*

New for Your Car

1. Flare Warns Approaching Cars. Long in use by truck drivers, fusees are now compactly packaged as passenger-car emergency equipment. Ignited by rubbing its friction cap against the ignition head, each fusee will burn 15 minutes with a red light bright enough for you to make a night roadside repair in safety.



2. Plastic Covers Worn Armrest. You can hide torn or faded upholstery on armrests with pliable-plastic covers installed with a screwdriver. Three models, in five popular colors, fit almost all cars.

3. Sun Shield Works on Roller. Operating on the principle of a window shade, this amber acetate screen protects you from glare when drawn over the windshield. A suction-cup clip holds it in position.

4. Battery Charger Installed in Car. A small, lightweight battery charger that can be installed under the hood of your car will provide a recharge from an ordinary 115-volt outlet. Designed for both 6- and 12-volt batteries, it can be hung on the garage wall for use with two cars. Self-regulation prevents overcharge. A dashboard plug and socket with capacity meter and pilot light are also available.

Further information on these new car products can be obtained from: 1. Kilgore, Inc., Westerville, Ohio; 2. J. & S. Mfg. Co., 2645 S. State St., Chicago 16; 3. SolRol Mfg. Co., 4404 S. Western Ave., Chicago; 4. Paul D. Rosenthal Co., 320 S. Swall Drive, Los Angeles 48.

HOW TO BUILD An Extension

By Walter E. Burton

YOU can hear the ball games at your ease on a camping trip by adding a simple extension speaker to your car radio. With its long cord, you can carry it to a picnic table, down to the beach, or right inside a vacation cabin where other power may not be available.

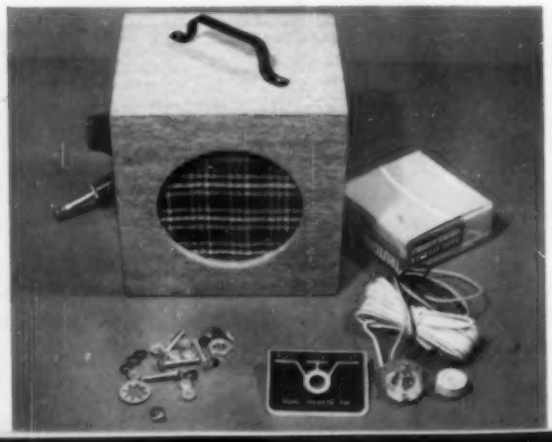
This inexpensive rig has its own rheostat so you can control the volume without running back and forth to the car. A built-in reel stores the cord inside the speaker case and winds it back up.

Since you have to carry the speaker in the car anyway, a perfect spot is on the rear shelf. This gives you a back-seat speaker for those who want to listen when the people in front want to talk. When you get home, you can unplug the unit and even use it as an extension speaker for a house radio.

You can do a professional-looking job because the main control is a store-bought switch, made especially for cars, that mounts neatly on the dash. With it, you can turn on the regular speaker or the extension or both together.

Small speakers work well. I used a 4″ permanent-magnet speaker and was amazed at the quality it gave—better, in fact, than it did on the original set.

A reel with 4″-diameter flanges will hold about 50′ of extension-cord lamp wire. If you need a longer cord, the



DUAL-SPEAKER CONTROL (in foreground) makes wiring easy. You can buy it complete from radio and auto-parts stores. Three-position switch, which mounts on dash, lets you turn on either speaker or both together.

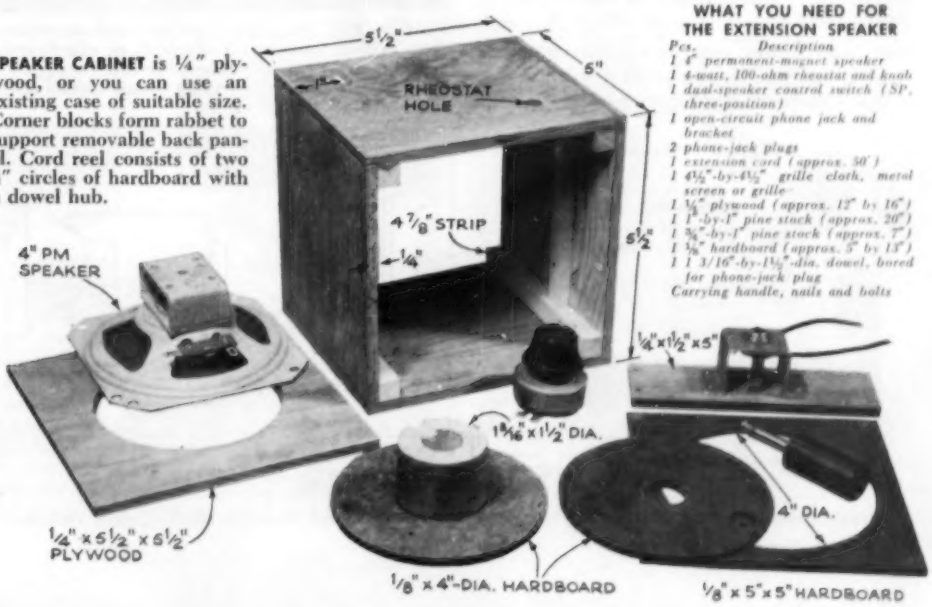
Speaker for Your Car

speaker case may have to be enlarged.

You can make the box any way you like or follow the one I made. The only real trick is locating the phone jack so that when the cord reel is plugged into it the outer flange will be flush with the back of the box. To make sure, mark the jack position with the reel plugged into it and lined up with the back.

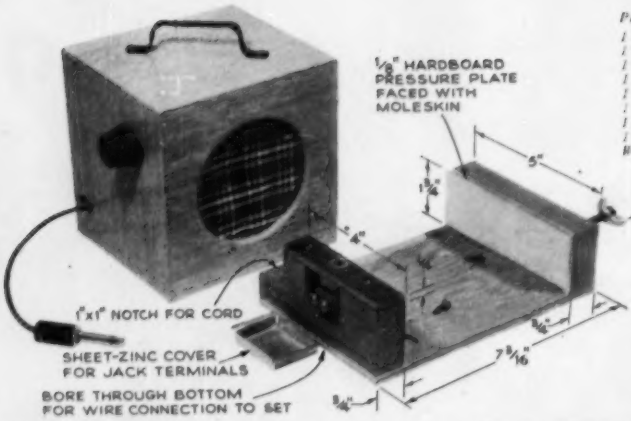
To hold the speaker—and keep it from

SPEAKER CABINET is ¼" plywood, or you can use an existing case of suitable size. Corner blocks form rabbet to support removable back panel. Cord reel consists of two 4" circles of hardboard with a dowel hub.



WHAT YOU NEED FOR THE EXTENSION SPEAKER

Pcs.	Description
1	4" permanent-magnet speaker
1	4-watt, 100-ohm rheostat and knob
1	dual-speaker control switch (SP, three-position)
1	open-circuit phone jack and bracket
2	phone-jack plugs
1	extension cord (approx. 50')
1	4½"-by-4½" grille cloth, metal screen or grille
1	¼" plywood (approx. 12" by 16")
1	1"-by-1" pine stock (approx. 20")
1	⅜"-by-1" pine stock (approx. 7")
1	⅛" hardboard (approx. 5" by 13")
1	1 3/16"-by-1½"-dia. dowel, bored for phone-jack plug
	Carrying handle, nails and bolts



WHAT YOU NEED FOR THE CAR-SHELF CRADLE

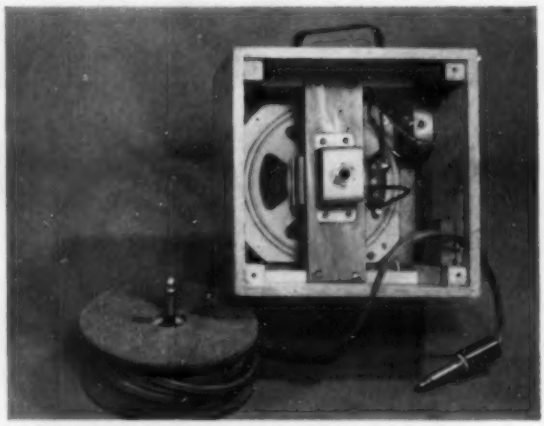
Pcs.	*Description*
1	*1/4"-by-5"-by-7 3/16" plywood*
1	*3/4"-by-1 3/8" hardwood (approx. 10")*
1	*1/4"-by-3/4"-by-4" hardwood*
1	*1/8"-by-1 3/4"-by-5" hardboard*
1	*1 3/4"-by-5" adhesive moleskin*
1	*1/4"-20 wing bolt*
1	*open-circuit phone jack*
1	*sheet-zinc cover for jack terminals*
Wire, screws, nails and wire clips	

CRADLE, screwed to shelf above rear seat, keeps speaker from being jolted off. Pressure plate is nailed at ends through oversize holes so that wing bolt through block can spring it inward to clamp the speaker cabinet.

becoming a projectile in case of a fast stop—you can make a simple cradle of wood. This is screwed permanently to the shelf, but has an adjustable pressure plate at one side that locks or releases the speaker case.

The other side of the cradle is cut out to take a second phone jack into which the cord is plugged when you use the speaker as a rear-seat speaker. If the jack terminals extend beyond the face of the wood block, as in the cradle shown, shape a cover for them from sheet zinc.

The wire from the dash switch is led up through the bottom of the cradle to the phone-jack terminals. You can run this under the rug along the floor or under the car, if you prefer, but tuck it away where it can't trip passengers.



PLUG-IN REEL snaps into jack mounted on cross strip behind speaker, serving both as axle bearing and electrical connector. Rheostat in upper right-hand corner gives you volume control independent of control on set.

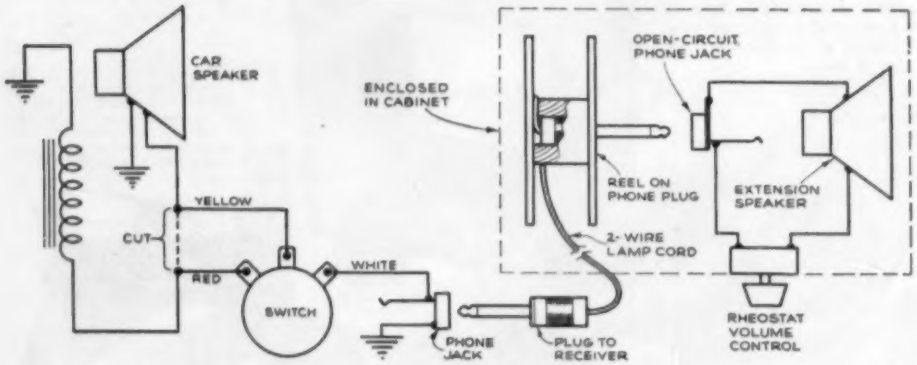
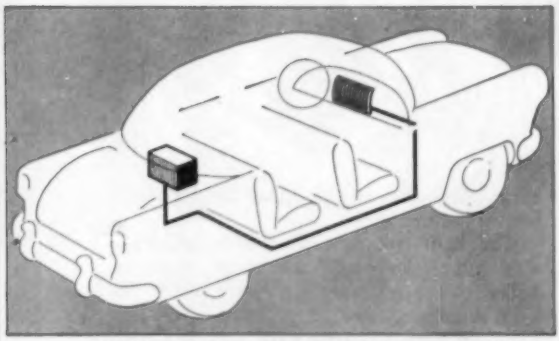


Diagram shows how extra speaker (at right above) is wired through dual-control switch.

REEL HUB is drilled out to take phone plug. Cut plug housing 1 3/16" long—the length of the hub—and notch end so cord can be led out sideways through matching notch in hub. A setscrew in the hub locks the plug.

OUTER FLANGE OF REEL should be flush with back panel, which is screwed to corner blocks of cabinet. Finger recess, cut in reel, helps you rewind cord. Two notches at the edge let you pry reel out if the extension cord fouls.



TO KEEP WIRE AWAY FROM FEET, run it behind dash and fiberboard, under rug and back seat, and up through trunk to phone jack on cradle.

ALMANAC
FOR MOTORISTS

Pithy proverbs, provident counsel and omens and portents of interest to horseless-carriage operators.

▸▸**Watch the way** a man uses the brake if you want to assess his driving ability. The man who is continually footing between gas and brake isn't really expert. A fine driver does much of his slowing by "feathering" the gas.

▸▸**If you are trapped** in traffic on a scorcher, try revving the engine up for a few minutes. Thanks to the fan, some engines will run cooler at medium revs than they will at idle.

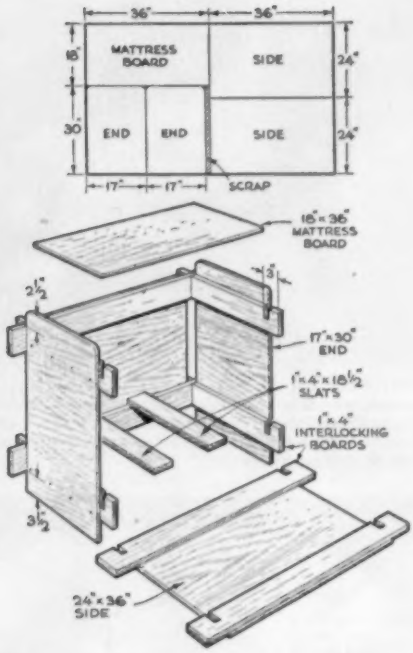
▸▸**In the** Malevolent and Destructive Order of Road Hogs (emblem: sideswiped initials M.D.O.R.H. in a blood-red setting), members work their way up through such lower grades as the Dumb & Incompetent, the Sloppy & Selfish, and the Get Over, Yourself! ratings. At the pinnacle, if they survive, is the select group of Inexorable Lane Straddlers.

▸▸**Fill your battery** extra often on a vacation trip. Even a well-regulated electrical system will try to stuff extra amperes into a battery on high-mileage trips, so the electrolyte drops a lot faster than it does on short trips around town.

▸▸**A frayed fan belt** bodes trouble. So he who eyes it occasionally is less apt to be caught with his belt down.

KNOCKED-DOWN CRIB stored on the floor of the trunk leaves plenty of space for mattress and family luggage. Interlocking slots in 1"-by-4" framing boards (right) make assembly easy. Sides and end sections are interchangeable.

Portable Crib Stows Flat in Car Trunk



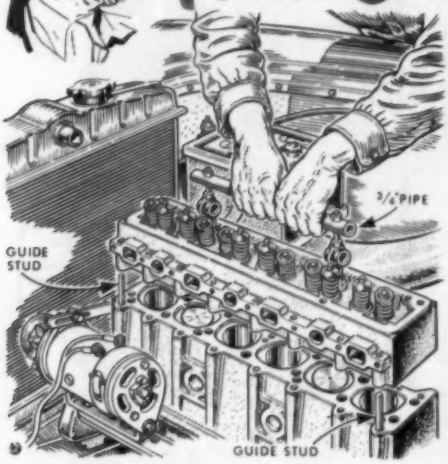
TRAVELING ACCOMMODATIONS give a youngster his own familiar bed in strange surroundings. Diagram at top of drawing at right shows how sections are laid out on one plywood sheet.

MOTELS and vacation cottages often make no provision for very young guests. If they can set up a crib, it's usually a dollar or two extra on the bill.

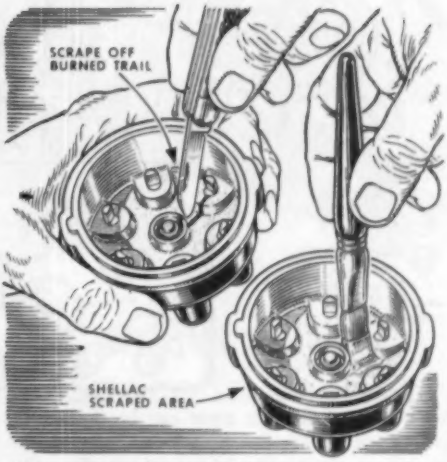
With a lightweight portable crib that you can stow flat in the trunk of your car, and set up or take down again in a matter of minutes, you can provide your child's own accommodations—and avoid one of the petty annoyances that can dampen the fun on a family vacation.

This crib cost less than $10, including a standard 18"-by-36" bassinet mattress. Sides, ends and mattress board were cut from a single sheet of ¼"-by-4'-by-6' plywood. Framing boards were attached with glue and countersunk flathead screws.—*David X. Manners, Norwalk, Conn.*

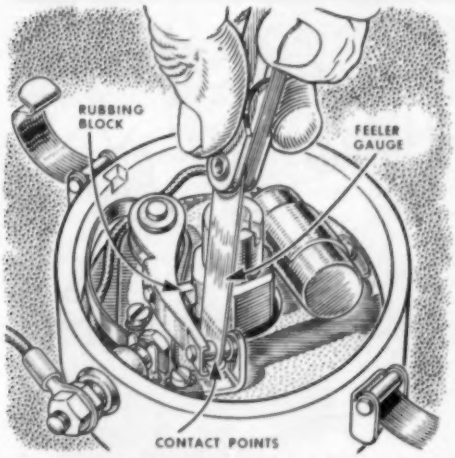
Hints FROM THE MODEL GARAGE



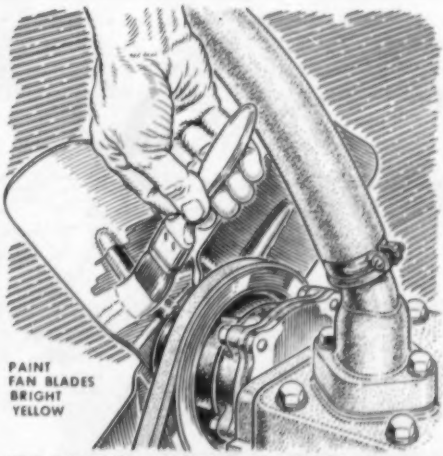
Tired of lifting overhead-valve heads for a succession of ring-and-valve jobs, one mechanic devised a convenient handle. Removing the rocker arms, he bolted a length of pipe to the brackets. Studs in hold-down bolt holes guided replacement.



You can make a quick repair of a short in a distributor cap by scraping clean its telltale carbon trail between terminals and then coating the area with shellac. If all the carbon is removed, the shellac insulation should last a long time.



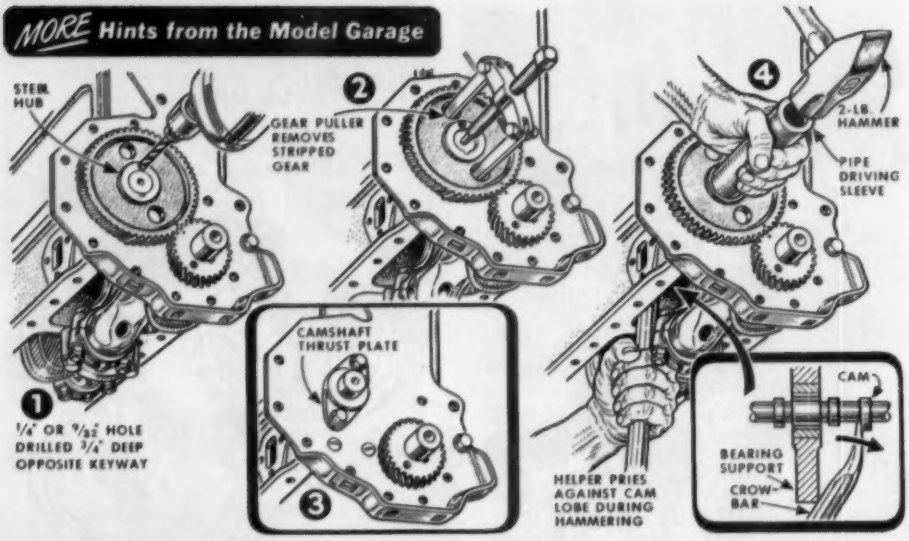
When you replace points, be sure to check the gap at intervals of around 1,000 miles until the fiber rubbing block shows a glaze. It wears rapidly until then, and may shorten the gap enough to make starting hard or burn the points.



Bright-yellow paint on the fan blades may save you a cut hand. Painting the hood prop rod and its slot, too, will help you fit them together in the dark or dim light. The color has high visibility. Clean off all grease first so the paint will stick.

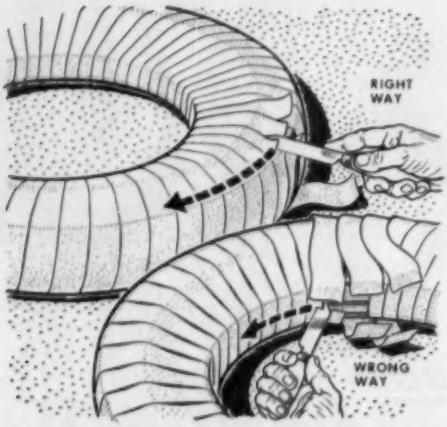
Please turn the page for more auto hints

MORE Hints from the Model Garage



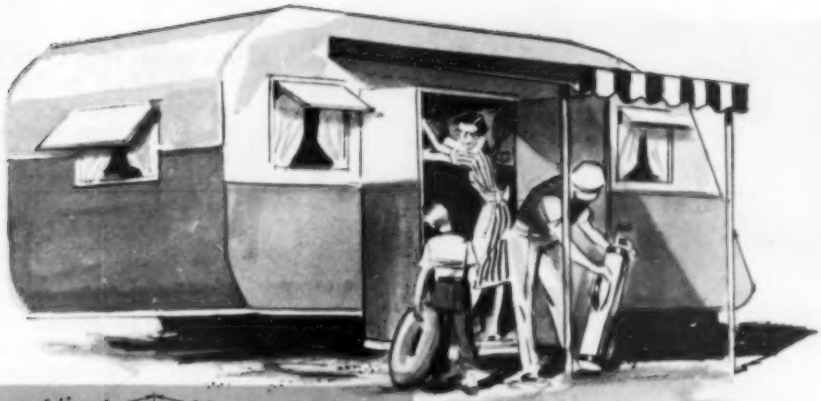
A Chevrolet timing gear can be replaced without removing the camshaft if you drill the hub opposite the keyway to weaken it so the web won't break under gear-puller pressure. Don't drill the shaft. Weaken further by driving in a tapered punch.

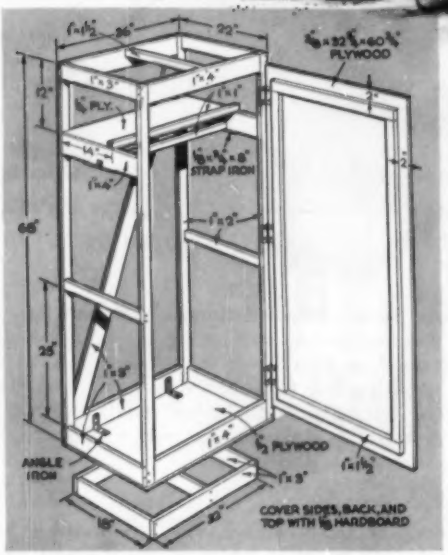
Standard practice may damage the thrust plate and require replacement, which this method avoids, but check it and the Woodruff key. Film the shaft with No. 10 oil and be sure the punch marks on the new gear and crankshaft gear are in mesh. Drive with short, sharp blows, using a piece of pipe as a driving sleeve, while a helper supports the shaft with a crowbar wedged carefully so as not to burr the cam. Stop when a feeler gauge shows .002" clearance between hub and thrust plate.



Wraps on tubeless tires should never be cut through between beads. It's bad practice on any tire, but with the tubeless type you stand the added chance of cutting the sealing area, causing a leak. Slice at the shoulder, where nicks are superficial.

Heavy cardboard cartons, frequently used as disposable trash boxes in a home garage, are easier to move if you tie the cover flaps in a vertical position and slot the ends for handles. The lengthened sides will also give you added capacity.





Cabinet Saves Space in Trailer

A STURDY utility cabinet, which we place outside our trailer when we're parked, gives us more room in our rolling home. Designed to hold old clothes, garden tools and other work equipment, the 2′-by-3′-by-6′ cabinet fits easily through the trailer door, and is light enough to be moved indoors or out by one person.

The framing was all cut from ¾″ pine, the door, shelf and floor from exterior plywood. Tempered hardboard covers the top, sides and back of the cabinet, which is painted to match the trailer itself.—*A. V. Malone, Los Angeles.*

Jig Drives Bullet Catch

A JIG that prevents damage to a bullet catch can be made easily by drilling a hole, bullet-size, into a scrap of wood. Fit the jig over the catch and hammer away.—*Frank A. Javor, North Bergen, N.J.*

Key Makes Handy Screwdriver

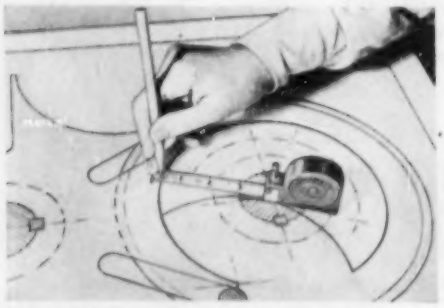
AN OLD key, hammered flat and filed to shape, is a handy pocket screwdriver. Kept on a chain with the car keys, it's always ready for emergency use.—*Gilbert C. Close, Hawthorne, Calif.*

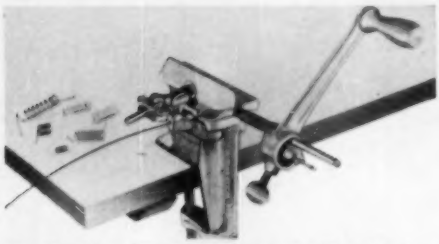
3. Abrasive Won't Clog. You can now get sandpaper designed especially for paint, which quickly clogs most ordinary papers. After 100 strokes, the new paper at far left remains clear and usable, while ordinary paper of the same brand and grit size (left, foreground) shows loading and high spots. The abrasive has a wave-like pattern that leaves open spaces for particles to fall out, yet has sharp ridges for fast cutting.

New Tools

1. Jigsaw Sharpens Bandsaw Blades. Mount a file in any jigsaw and you can power-sharpen your own bandsaw blades in a few minutes with this holder. Several teeth can be filed at a time by coiling a blade and clamping up to three thicknesses together. Adjustable jaws take either standard or skip-tooth blades from 3/16″ to 1¼″.

2. Rule Serves as Compass. You can draw circles up to 12′ in diameter with this steel measuring tape. A lock holds the rule at the desired length, and a retractable pin is pressed into the work. A hole at the tip lets you insert a pencil, pen, knife blade or metal scriber.

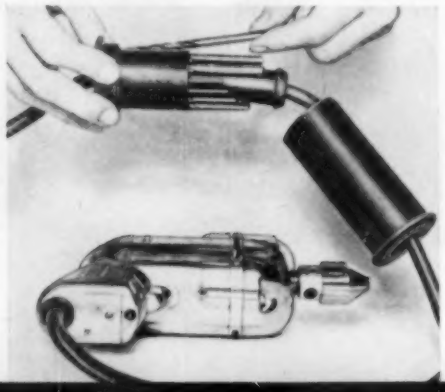




4. Spring Winder Clamps to Bench. Any size or type of small spring can be quickly wound on this bench attachment. An adjustable guide feeds the wire at any desired coil pitch, while the crank handle can be clamped to different-size rods to vary the diameters of the springs.

Further information on the tools shown on this page can be obtained from: 1. Riverside Enterprises, 14 Riverside, Corning, N.Y.; 2. Walpole Co., 419 Boylston St., Boston 16; 3. Armour and Co., N. Benton Rd. and Webb, Alliance, Ohio; 4. General Cement Mfg. Co., 919 Taylor Ave., Rockford, Ill.; 5. Donart Co., 425 E. Plymouth Circle, Minneapolis 16.

5. Drill Cord Keeps Bits Handy. You don't have to hunt around for drill bits with this container right on your drill cord. The rubber pouch is slit down the center so it can be slipped on and off the cord quickly without removing the plug. It holds 13 bits from 1/16″ to ¼″.



By Art Margolis

A mystery among the tombstones didn't stump this repairman. His solution helps to explain

Why TV Condensers Give Up the Ghost

IN A howling gale one night I answered a call to an outlying address. Behind the iron gate that bore the number lay a cemetery, its markers gaunt and white in the glare of my headlights.

Wind whipped by as I rang a rusty bell. Its hollow clang brought a hooded figure scurrying out of the darkness.

"Glad you came," said a sepulchral voice. "I'm the caretaker. Follow me."

Grabbing my tool kit a bit harder, I tagged along. At the end of a barely visible path was a shacklike little house. A door opened on a cozy room, with a big-screen TV set against one wall.

"Sure hope you can fix it," said my guide. "Kind of lonely without it."

The picture showed a thick translucent bar continually creeping downward. I knew this bar was a hum in the picture circuit, and from the set's power supply.

A wall socket can provide only 60-cycle, 115-volt alternating current. But a TV circuit requires high-voltage direct current. So a transformer is used to step up the juice to several thousand volts. Then a rectifier turns it into DC, still pulsating and loaded with hum.

To smooth out the pulses, a filter condenser is put across the power supply. This can store a certain amount of electricity. The ripples of current keep the condenser filled, while the TV circuits can draw a steady flow from it.

The filter condenser in this set was defective; one of its pigtail connections had broken off inside because of oxidation, excessive vibration, or both. The pulsating DC never reached it, but went right on to the picture. I replaced the

bad condenser and left my customer and his spooks to enjoy the show.

Being a TV serviceman, I'll replace my share of the 7,000,000 condensers that will turn up their electrical toes in TV sets this year. Most people wonder why condensers (also called capacitors) go bad. Here are three more examples of the way they die in line of duty.

The Case of the Cremated Tubes

WHEN I arrived, the back was already off the set. On top of it lay three similar tubes. Sheepishly my customer explained that he had located a bad tube, installed a new one, and seen it flare up and burn. After cremating three tubes, he had given up and called me.

Checking the DC voltage at the tube socket, I found 350 volts on the grid, which in this case was supposed to have only two volts. This spotted the trouble as a shorted blocking condenser.

The plate of a vacuum tube may require as much as 400 volts of direct current to attract the pulsating electron stream that carries sound or picture. This same pulsating signal must then go to the grid of the next tube, which would curl up in smoke if all that 400 volts of DC should happen to hit it. How to pass along one and not the other?

A condenser will *store* but not pass direct current; it acts like an insulator in a direct-current line. But the same condenser will shoot along an alternating or pulsating current in fine style. It's as if you put a flexible waterproof diaphragm in the middle of a water trough. No water could pass fron one side to the other, but if you kicked up waves in one half of the trough, there would soon be waves on the other side.

While playing the part of a holdback dike to DC, the condenser is subject to the full voltage pressure. This is constantly trying to break down the dielectric, or insulation, between its plates. How much pressure a condenser can stand is specified as its working voltage, but heat, overloading or deterioration may alter it. This one had broken down.

I proved it by unrolling the condenser. Its paper dielectric had a puncture, so the foil plates were actually touching—and 350 volts DC was free to shoot through to the following grid. With the defunct blocking condenser replaced and a new tube in the socket, the picture blossomed on the screen.

Calling Doctor Kildare

MOST emergency cases go to the hospital; mine came from one. I was called to lower a patient's blood pressure by fixing a TV that was driving it up. The picture would come in splendidly, only to whip off into horizontal lines. Adjustments did no good, but suddenly the picture would snap back by itself—only to streak off again just when the viewer settled back to enjoy it.

Using electrical probe and scalpel, I tracked the trouble to the horizontal oscillator. Any picture is actually composed of a single sharp electron beam, sweeping from side to side over the screen at the rate of 15,750 times per second. Exactly that many impulses per second are supplied by the horizontal oscillator; if for any reason it puts out more or less, the picture turns into bars.

A condenser acts as a split-second timekeeper in this case. It takes a definite amount of time to fill up with all the electricity it can store, and then empty out, and it is sized and matched to other parts so that it will do this precisely 15,750 times per second.

Now the storage capacity of a condenser depends partly on the distance between its plates, or the thickness of the insulating dielectric between them. In this case, I found that the frequency controlling condenser was being affected by the heat of the tubes. Its dielectric was expanding and contracting, changing its capacity and therefore the rate of the horizontal oscillator.

A new condenser, placed where it would not be affected by the tubes, restored the stability of the circuit and the equanimity of the patient.

It's the Woman Who Pays

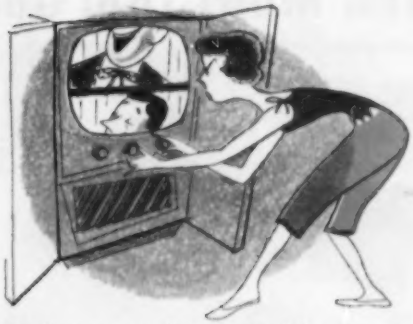
EVEN before I got my tool kit open, the teen-aged daughter of the house proudly told me that she was going to pay the bill. Her receiver was getting a good picture, but it would not lock in place vertically. Despite adjustment of the vertical-hold control, it slipped frame by frame, like one of those old movies.

A TV picture beam is swept from top to bottom of the screen by the vertical oscillator, which is designed to supply about 60 cycles per second. Running free, it may vary from 55 to 65, and such variations let the picture slip slowly.

However, the broadcast TV signal includes a vertical-locking component of exactly 60 C.P.S. This forces the vertical oscillator to run at the same frequency.

There's one catch: the low-frequency locking signal is all mixed up with other signal frequencies, from which it must be separated. So a special network of low-pass filter condensers is tied in ahead of the oscillator. The high frequencies can't fill these big fellows and simply get lost, but the 60-cycle pulses charge them up exactly that often every second, and so trigger the oscillator in exact time.

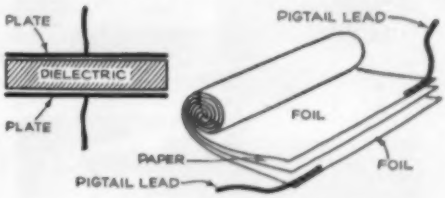
I found one of these low-pass filter



condensers so deteriorated by age and humidity that its dielectric no longer insulated. It was behaving like a resistor rather than a capacitor. The signal was not being filtered properly, so the vertical oscillator was unstable.

After I had put in a new condenser and the picture had settled down, the girl proudly handed me what she said was her first pay check. I told her I'd take it and give her change, but that it was no good to me without her endorsement.

A bit flustered, she took it back, hesitated, and then thoughtfully wrote on the back: "I think this serviceman did a wonderful job. Jane Adams." END



What's in a condenser? Basically any condenser is a sandwich of two conducting plates with insulating material between. When extra electrons are pushed onto one plate (giving it a negative charge) they repel an equal number of electrons from the other, leaving it positively charged.

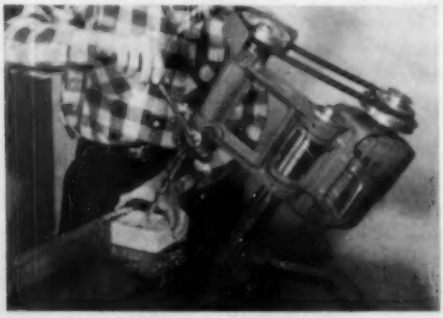
The earliest condensers were Leyden jars—glass bottles with foil pasted inside and out. Some modern condensers consist of interleaved foil and paper, rolled up for compactness. Others are made of plastic or ceramic, in the form of wafers, blocks or cylinders. Electrolytic condensers use chemicals to form a dielectric coating between the plates.

New Multi Tool Goes with You

HERE's a combination tool you can take with you—to a summer vacation cottage or upstairs to finish the attic. It is easily dismantled into three components—the base (95 lb.), tilt table (22 lb.) and spindle head and boom (53 lb.). These units can be stored in the average car trunk with space to spare.

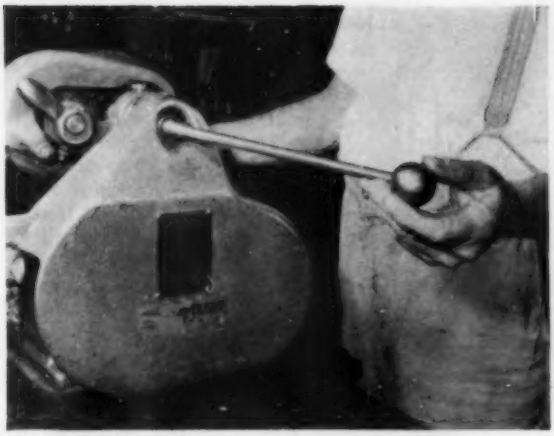
The heart of the tool is a tilting boom and rotating power head. In a matter of seconds, it shifts from one to the other of its functions of saw, lathe, drill press (or horizontal drill), sander, shaper, or grinder and polisher. Although the tool has a large table surface, it occupies only 20″ by 26″ of floor space. Called the Paramount, it's made by Ideal Metal Products Inc., 1644 W. Lafayette Blvd., Detroit 16. It sells for $279.50.

BY CANTING POWER HEAD slightly off-center, you can make automatic taper turnings like this. For sawing, sanding and grinding, the power head is rotated below the table level.



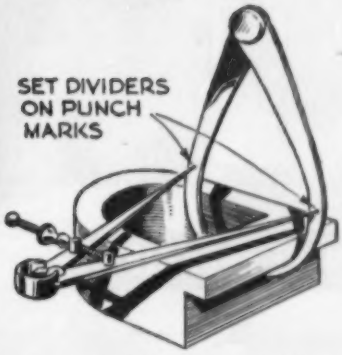
MOTOR BOOM can be set at any angle from vertical to horizontal by a quick-release pinch lock. The table tilts for angled sawing, sanding and other operations performed by the tool.

NEW Shop Ideas



Ramrod Clears Spindle. Instead of hunting a suitable piece of scrap when you have to knock a taper-shank accessory out of a lathe spindle, save time and temper with this ramrod, which can't damage the bore.

Drive a brass nose 1/32" smaller in diameter than the spindle bore onto a ⅜" rod 4" longer than the spindle. Thread the other end for a brass ball or gear-shift handle.—*H. L. Luckett, San Antonio.*



Transferring Caliper Setting. Where inside or outside calipers cannot be withdrawn from the work without changing their setting, the dimension they measure can be transferred with dividers. Make a light punch mark on each caliper leg first. Adjust the calipers on the work, and set the dividers precisely to the punch marks.

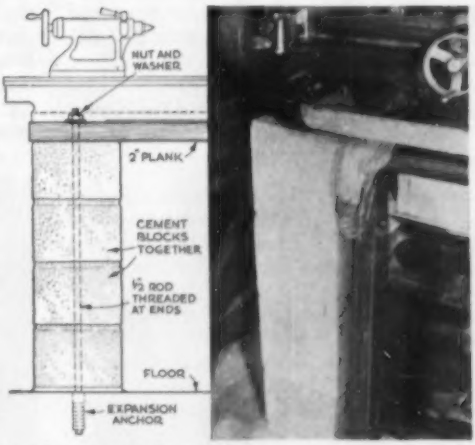
After removing the calipers, reset them by aligning the punch marks with the divider points. —*A. E. Clamp, Sacramento.*

Rubber Quiets Hacksaw. When a power hacksaw cuts through a piece of work, the saw frame usually drops with a bang and a shock.

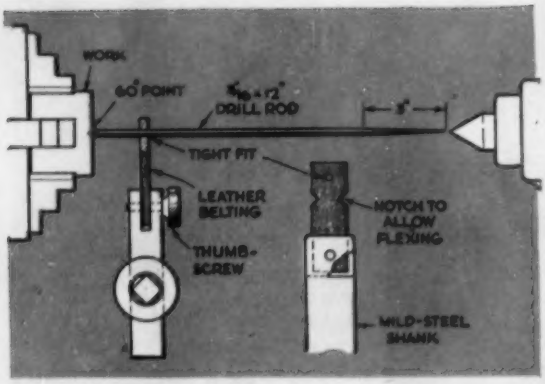
This can be absorbed, saving wear and tear on both the machine and the nerves, by mounting a sponge-rubber block under the arm.

Lathe Rests on Blocks. Cheaper than lumber, more rigid than steel, machine stands made of concrete blocks are easy to build and especially suited to a workshop having a concrete floor.

A height of three or four blocks is suitable for lathes and other power tools. Drive an expansion anchor into the floor at each pillar location first. Screw a long steel rod into each anchor, cement the blocks together around it, and clamp a heavy plank across both pillars with a washer and nut on each rod. Bolt the machine to the plank. The space between the pillars is handy for storing tools and machine attachments, either on shelves or in a cabinet.—*Phil McCafferty, Stanwood, Iowa.*



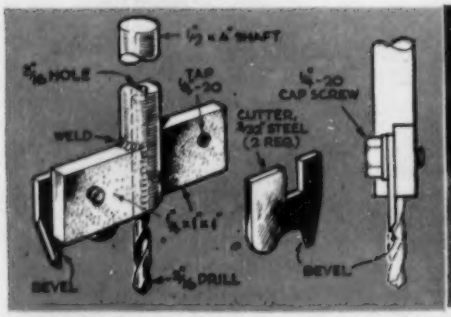
Please turn the page for more shop tips

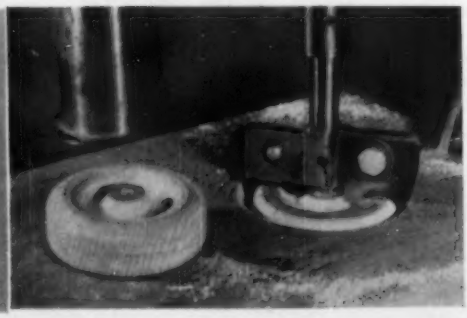


Needle Centers Work. Made in an hour, this center wiggler has been useful to me for years. With the short end in the punch mark to be centered, spindle is turned by hand. The long end then circles around, magnifying any run out and showing which way to adjust the work to bring the mark dead true, when the needle will remain still.

Cut a piece of bar stock to suit the tool holder. Slot one end a snug fit for a piece of stiff new leather belting. Drill and tap for a clamp screw. Notch the belting as shown, punching the hole a tight fit for 3/16" drill rod. Form a long taper on one end of the rod, a true 60° point on the other.—*H. J. Gerber, Stillwater, Okla.*

MORE SHOP TIPS



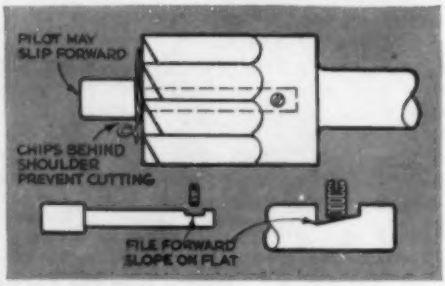


Cutter Turns Out Wheels. Our workshop club makes hundreds of toys for charity, but wheels were a bottleneck until we turned from the lathe to the drill press. This wheel cutter, run into ¾" stock, quickly shapes one side. The wood is then turned over and the cutter fed into the same hole to finish and cut the wheel free.

Two ¼"-thick cheek pieces were welded to a ½" shaft opposite each other, as shown. A 3/16" hole was centerdrilled from the end and tapped for a headless setscrew to hold an ordinary drill. Cutters filed to shape from 3/32" high-carbon steel and hardened are mounted with a single cap screw each. The bevel is formed on the back, so that the cutting edge is 1/16" forward of the shaft axis. I have found this mounting keeps the edge sharp longer, and our production of wheels is now quick and easy. To make different kinds, we simply switch cutters.—*Fred R. Taylor, Roseville, Ill.*

Taper Locks Pilot In. Removable counterbore pilots may slide forward enough to permit chips to lodge between them and the cutter head. These will prevent the teeth from cutting.

An easy solution for this is to grind or file the flat on the pilot with a forward slope as in the drawing at right. Once the screw is tightened on this slope, forward motion becomes impossible and the pilot stays in.—*Frank LaSaracina, NYC.*



For less than $100, you can install a baby inboard kit that makes a really

Kid-Proof Powerboat

By E. F. Lindsley

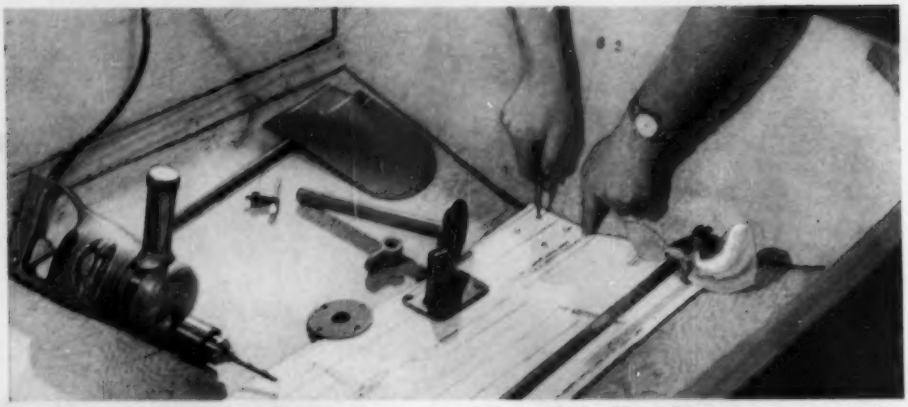
LET three or four kids loose in this baby inboard and they can be pirate captains on the high seas, pilots of a speedy racing boat, or anything else their imagination can cook up.

Yes, I said *inboard*. What's more, they'll be safe, too. This midget version is a one-lunger. It puts out 1¾ hp. at peak. Its top speed is a fast row. It won't win any races, but it won't get out of control, either.

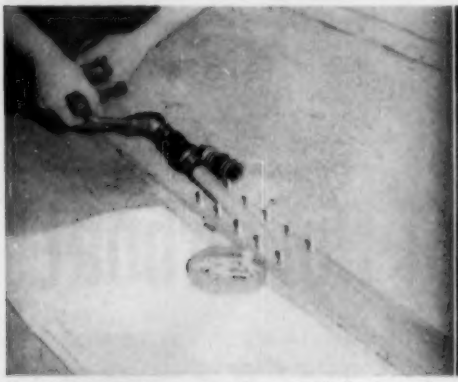
The engine comes as a kit. You can buy it for less than $100, and put it together in less than a weekend. The single price tag gets you not only the motor

FOUR-CYCLE ENGINE kicks off quickly under kid-size pull, idles smoothly, even clears itself if overchoked. In a small pram like the one above, it's light enough for easy handling.

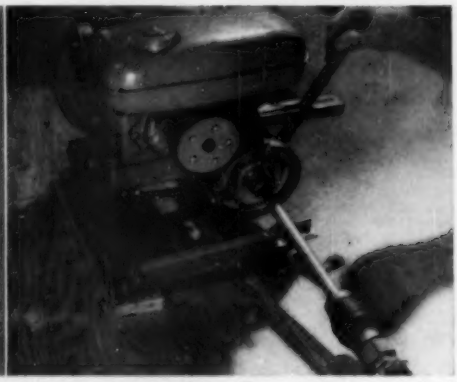
Kit has everything you need to install the engine quickly



FULL-SIZE TEMPLATE laid on bottom shows you where to drill bolt holes for all fittings. I added length of flexible tubing, an extra, to pipe engine exhaust out through transom.



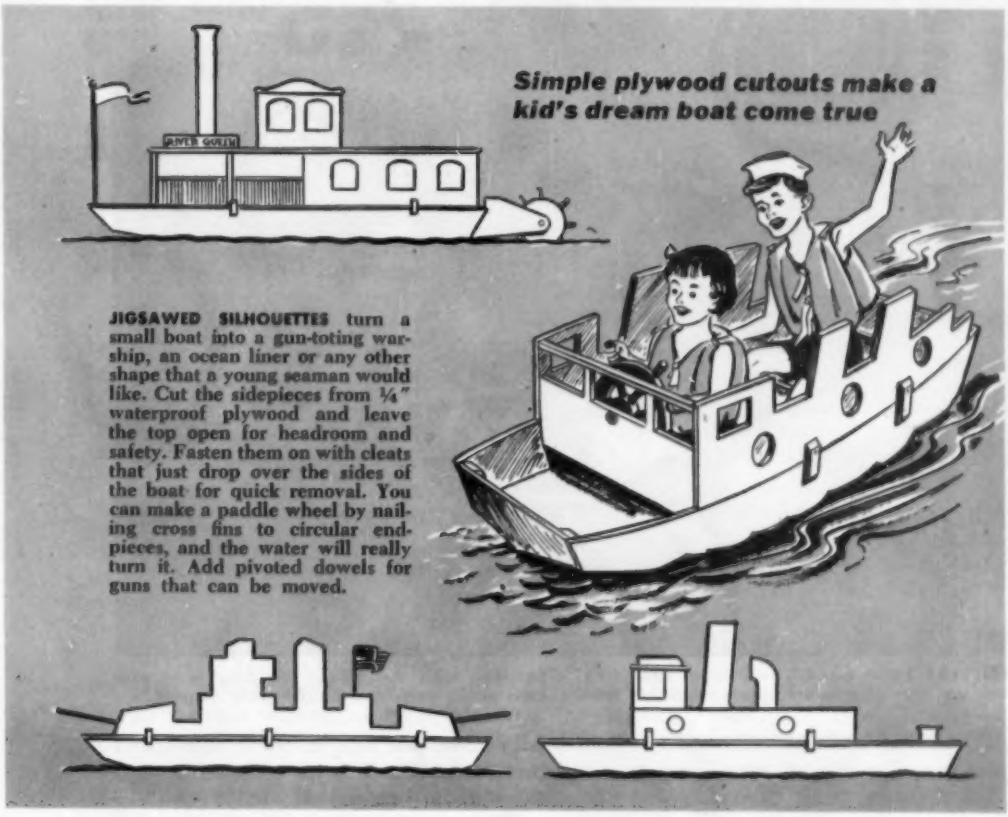
TRICKIEST JOB is running slantwise hole through the keel, but using the shaft fitting as a jig gets you aimed right. Once started, you can remove fitting and drill hole through.



MOTOR IS MOUNTED off center so prop shaft will line up with keel. Shift lever tightens shaft against a V belt for forward drive and against a friction drum for reverse.

RUDDER POST runs through bottom, instead of being hinged outside transom, so that entire assembly is hidden under rear seat. Steering arm is lined up with rudder and clamped tight.

FLAT AREAS must be planed on bottom to seat lower fittings tightly against the wood. If boat has center strip or keel, build up sufficient bearing area with filler blocks.



but all the parts for a complete inboard installation. If you've ever tried shopping for matched bearings, a shaft that will fit and a prop of the correct size, you may know that they come hard and high.

There's fun for the whole family, too. I built my boat for the youngsters, but now I sneak it away whenever the fish are running. You can really throttle it down for a near-silent slow troll. It also makes an ideal put-about for lazy sightseeing, or an auxiliary power plant for a small sailboat.

It's kid-proof. The engine, made by Reo*, isn't temperamental. It starts easily, runs forever, and is safe in the hands of apprentice seamen for—

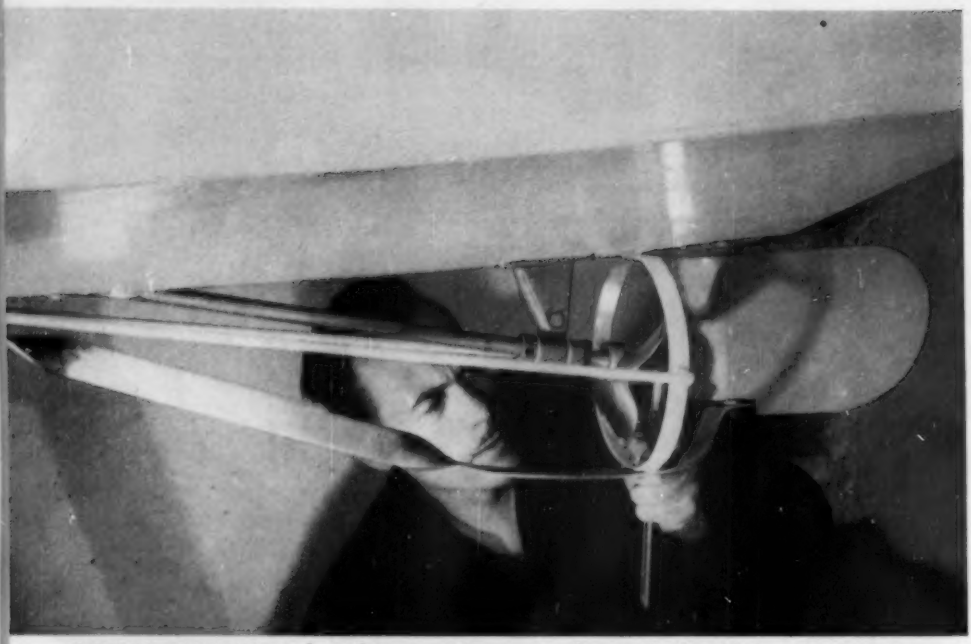
- It burns straight gasoline, so there are no scored pistons if the engine-room officer forgets to add oil.
- Its prop skims harmlessly over rocks and sandbars if the navigator happens to get off course.
- It sits low in the water, making the boat hard to tip.
- It can't heel under or ship water on tight turns since it's steered by a rudder instead of a powered prop.
- It can be started, stopped and put in reverse by a single shift lever, making control an easy one-hand job.
- And it's as forgiving as a mongrel pup of occasional mistreatment.

What kind of boat? I chose a small pram, which I built from a precut Ozarka kit*, but you can put the engine in just about any boat up to around 12′ long.

An old flat-bottom rowboat usually can be picked up cheaply and, calked against leaks, makes a very safe and stable craft. I've even found some folks

*Reo Motors, Inc., 1331 S. Washington Ave., Lansing 20, Mich.

*Ozarka, Inc., Washington and Borden Sts., Woodstock, Ill.



CIRCULAR PROP GUARD, bent from strap iron, was my own idea to help keep swimmers from tangling with the blades. Regular skeg protects shaft, prop and rudder from damage.

SIDE-BAR TILLER keeps rigging from under small feet, but you could run ropes to a wheel. I put in a loose plywood floorboard that lifts out for cleaning, can be tossed out as raft.

who have put one in their high-speed outboards. The kids have their fun with the outboard pulled off.

The special reverse drive, a neat bit of engineering in itself, puts the prop shaft to one side of the engine. If you want to run the shaft through the keel, as I did, you have to mount the engine off center.

Technically, this upsets the balance slightly, but you can offset it by stowing the anchor or a rock in the opposite side of the boat. Besides, you can't keep a kid centered, anyway.

If you have a keel that's too deep to make it easy to run a hole through for the prop shaft, you can shift the whole works sideways so that the shaft misses the keel. For strength, add stiffener blocks under the bearings and rudder-post fitting.

I bolted my engine down permanently so there'd be nothing to fool with or come loose. For quick removal for storing or carrying, you can substitute wing nuts. END

How to Build a Mower Sulky

LIGHT BUT STURDY, this sulky was built for less than $14, including the wheels. A spring-loaded bolt on the tongue bears on the underside of the mower frame, taking its weight off the operator. The hitch at the rear accommodates a lawn sweeper.

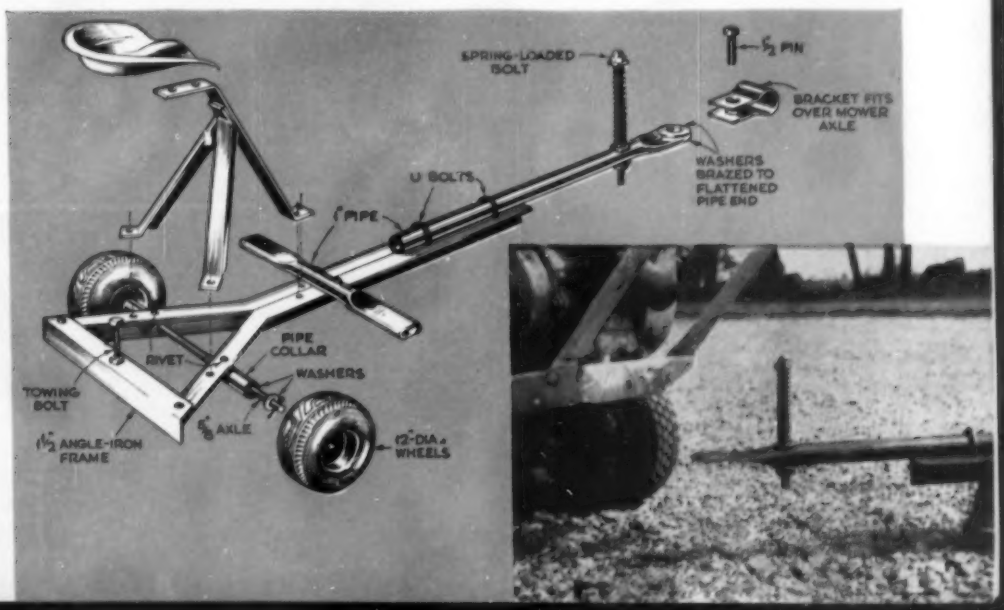
TIRED of chasing that big power mower? Then this home-grown riding sulky is for you.

Two 4½′ lengths of angle iron form the bed. Bolt them back to back for the greater part of their length. Then, just beyond the last bolt, remove a V-shaped section from the top surface of each angle iron and bend the pieces apart to form an elongated Y. Weld the edges of the cuts together and bridge the forked ends with an 18″ length of angle iron of the same size bolted in place.

Make the tongue from a 3′ length of 1″ iron pipe. Attach it to the bed with two U bolts. Flatten the forward end of the pipe and drill a hole for a ½″-diameter pin. Braze washers on both sides to act as bearing surfaces when you slip the coupling into a clevis passed over the power-mower axle.

To hold up the rear of the mower frame, pass a spring-loaded bolt through the unflattened section of the tongue behind the coupling. Form a tripod of angle iron, cut and bent as shown in the drawing, to support a pressed-steel seat directly over the triangular section of the sulky bed. Just ahead of it, bolt an 18″ length of flattened 1″ pipe across the frame for a foot rest.

Pass a ⅝″ steel axle through holes drilled in the vertical sides of the forked angle irons 6″ from the rear, and rivet the axle in place. To provide clearance for wheels, slip a short length of pipe, backed up by a washer, over each axle end. Drill for cotter pins.—*Arthur P. Sigal, Easton, Pa.*



6 Useful Stunts with Chemical Heat

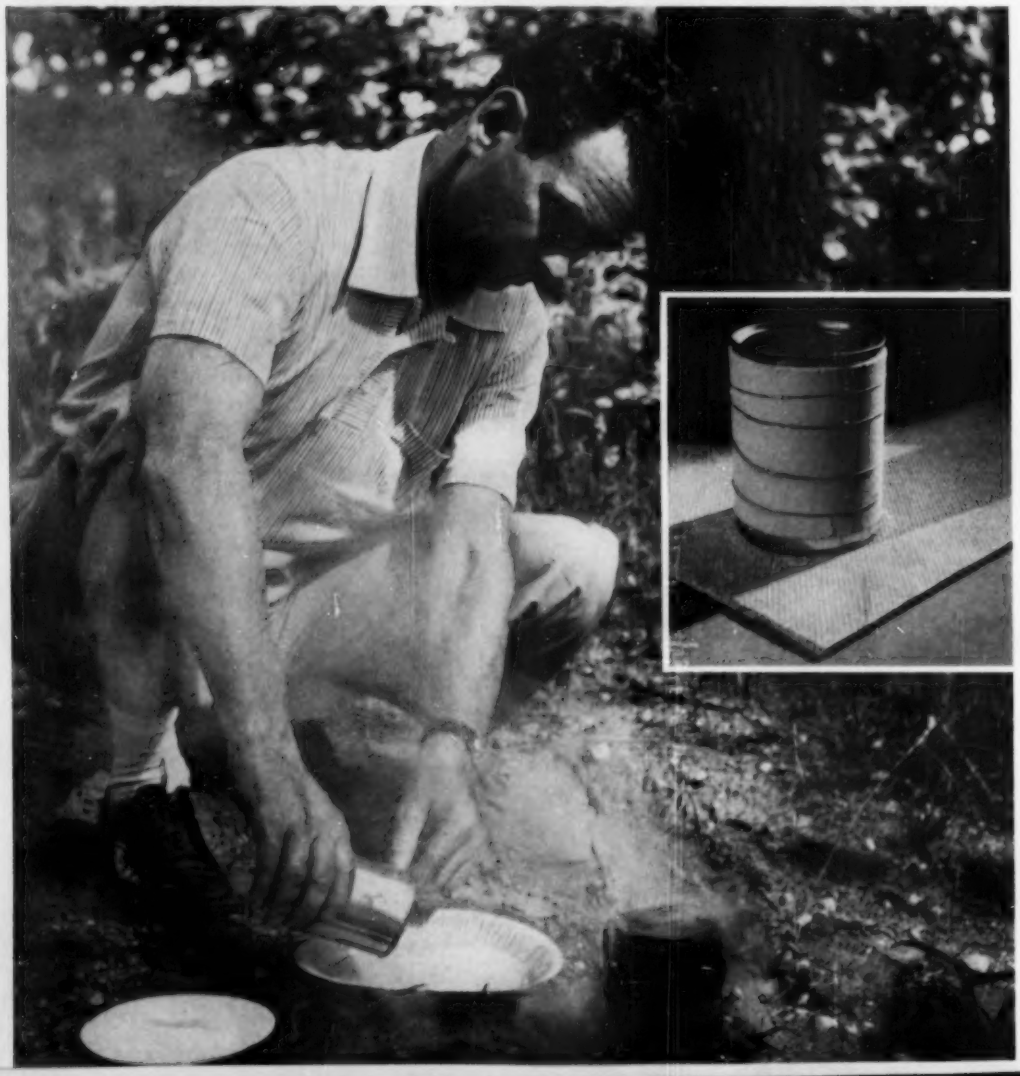
By Kenneth Murray

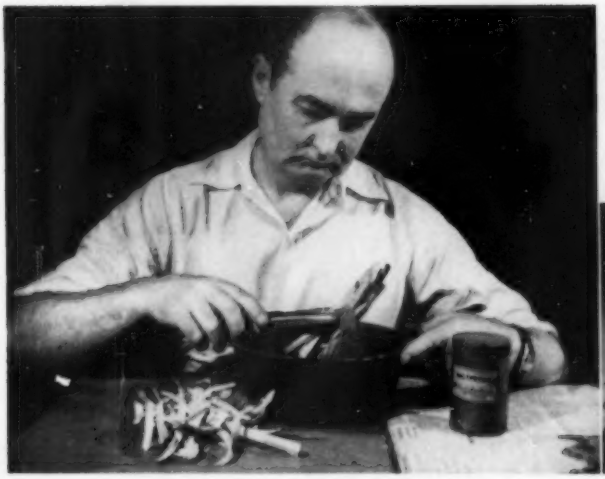
THERE are scores of useful applications for the intense heat produced by potassium nitrate, the chemical commonly known as saltpeter. Here are six.

The chemical is available by the pound at drugstores. Dissolve as much as you can in water to make a saturated solution. Then soak in it any of various organic materials—paper, cardboard, blotting paper, cloth, twine, rope. More chemical will be absorbed if the solution is warmed.

When dry, the impregnated material burns easily. Use it outdoors. It's smoky.

WARMING BEANS on a camping trip is a cinch if you use blotting paper that has been saturated in saltpeter solution and then dried. Wire the paper around the opened can and light it.





STARTING A FIRE is easier if you soak the kindling in concentrated saltpeter solution beforehand. It's a handy trick for a summer cottage.

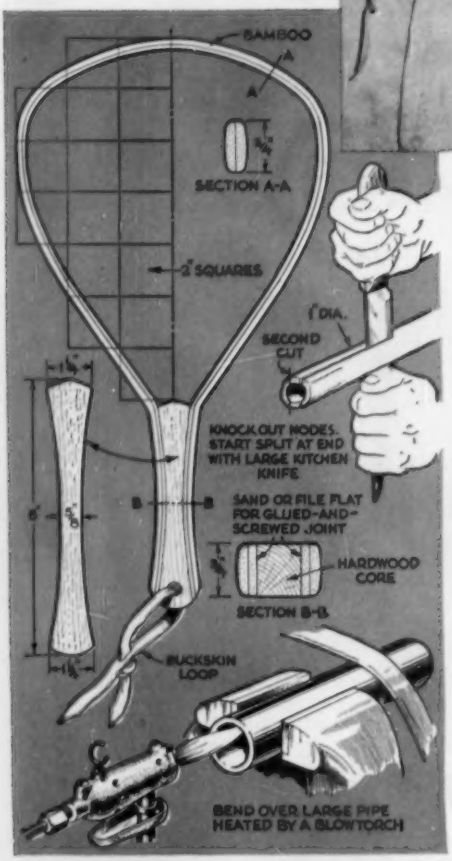
MATCHES BURN LONGER and stay lit even in a high wind if wrapped in prepared chemical fire paper.

YOU CAN DO SOLDERING JOBS where no power is available if you know about chemical heat. Slip a thick tube of impregnated cardboard over the shank of the copper, leaving room for the setscrew to hold it to the handle of the iron. Start soldering soon after you light it, and you may get two small jobs done. Another way to solder wires (above), is to loop rosin-core solder around the splice and wrap it as tight as possible with heat paper.

YOU CAN MAKE A HOT-PATCH OUTFIT for vulcanizing an inner tube. Pack a shallow can lid with the heat material and hold it in place on the inner tube with a C clamp.

REMEMBER THIS ONE FOR NEXT WINTER. Heat paper wired to the key handle will warm a frozen car lock in a few seconds. Frozen outdoor water pipes can be thawed the same way.

How to Make A Bamboo Landing Net



FOR this durable landing net, you'll need a bamboo pole about 5′ long and about 1″ in diameter, though dimensions are not critical. Knock out the nodes, the pith walls between ringed sections, with a rod or pipe, and then split with a big knife pushed through from one end.

Make the first split off center for a fairly flat inside face; then split off the excess on the larger half. File or sand the inside faces to get perfectly flat, smooth surfaces for gluing. Take care not to sand off the hard outside coating. It is a natural varnish-like finish that wears beautifully as well as providing an attractive appearance.

Bend the split pieces separately over a large pipe heated with a blowtorch. The inside face of one and the outside of the other should be on the inside of the curve. It may be easier to work if you plunge the pieces in cold water several times during bending to set the curve.

Then glue the two inside faces together with a good waterproof marine glue, and glue and screw in a handle core cut from mahogany or other hardwood, first sanding flat the face next to the core so the glue will hold.—*Hi Sibley, Nuevo, Calif.*

Tape Rim Safeguards Lenses

INEXPENSIVE salvage lenses used as magnifiers are less likely to break if fitted with soft-rubber rims.

Use electrician's rubber tape, cutting off a strip about half the circumference of the lens and splitting it lengthwise. Stretch one of the halves around the edge of the lens and lap the joint about ¼″—the rubber sticks to itself.—*Ken Murray, Colon, Mich.*

You can shoot

Better Pictures with Filters

By Herbert O. Johansen

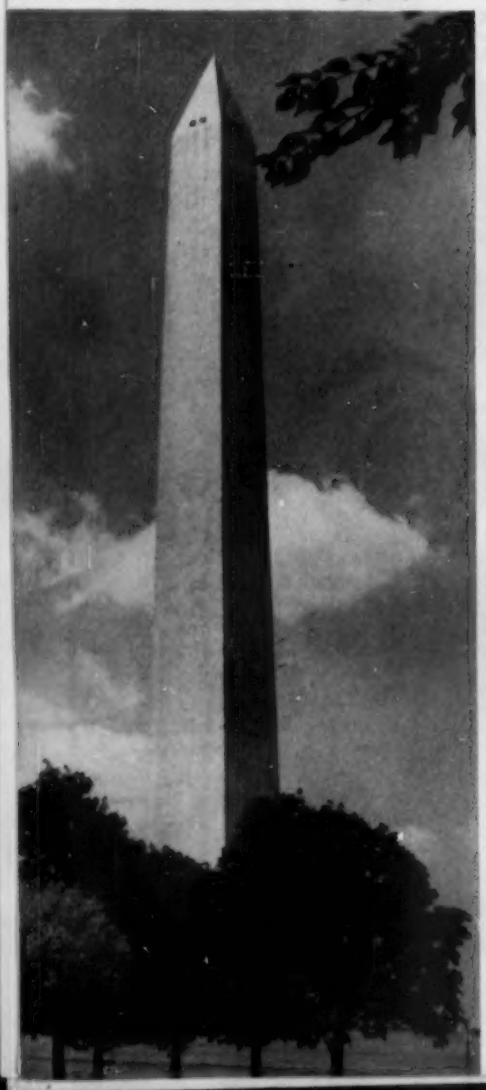
WHEN I graduated from a box Brownie to a reflex, I thought I had at last scaled the photographic peak of a weekend and vacation

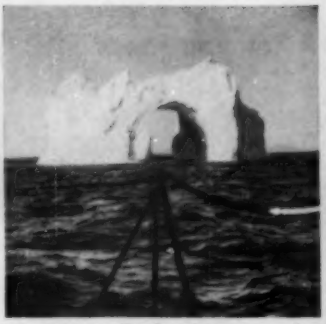
A RED FILTER makes blue skies black and helps dramatize buildings. Below is what it did for my favorite local church. The photo at left is without a filter.

snapshooter. A filter was something in the oil line of my car.

It was on a voyage to the Arctic last summer that photo filters came into my life. The peculiar light in the Far North, the vast expanse of icecap, the brilliant whiteness of icebergs, all conspired to defy every combination of exposure setting and lens opening. Then a friend suggested I try using his filters. What they did for me you can see at the right. Since then, my Graflex 22 has been no stranger to filters.

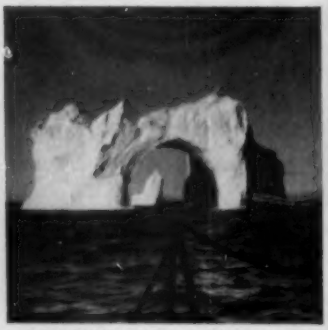
YELLOW FILTER brought out nice clouds behind the Washington Monument. Without a filter, they would have been lost in a gray sky.





NO FILTER. Lack of contrast between iceberg and sky, no details in the berg, wishy-washy.

YELLOW FILTER. Tone correction makes the sky and water darker and the iceberg stand out.



DEEP-YELLOW FILTER. More correction results in more contrast and more details in iceberg.

RED FILTER. Dramatic rendering of the cathedral-arch iceberg (right), obtained by very heavy correction of red filter. Blue sky is blackened and water darkened. For effect, a red filter is the one I use.

Please turn the page for more filter photos

SUNSET WITH POLAROID FILTER. Here it brought out effective bank of clouds and cut down reflections to produce water details.

ANOTHER JOB FOR RED FILTER. Shooting into the sun, I got this moonlight effect, with a brilliant path of reflection in the water.

MY PORTRAIT SHOTS had all been duds, like the flat, chalky-faced one in the inset. See how use of a light-green filter gave me contrast and brought out the flesh tones. END

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10 USES FOR Old Garden Hose

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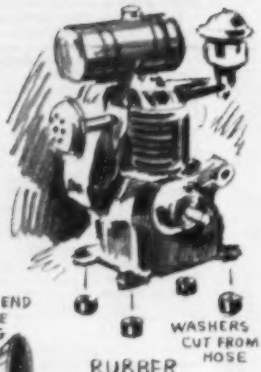
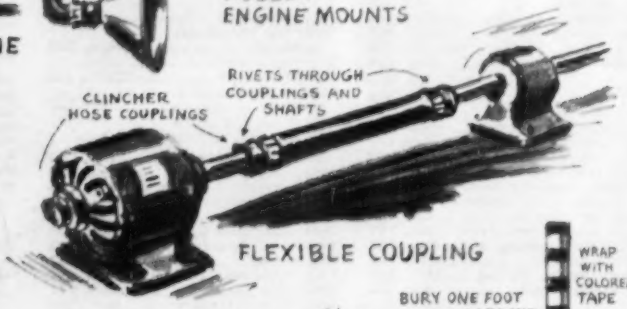


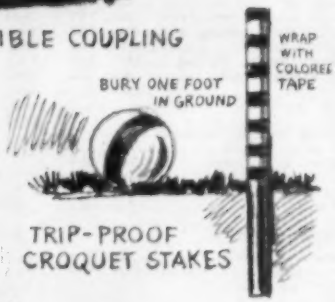
RUBBER ENGINE MOUNTS

RUNGS FOR ROPE LADDER

HANDLE-BAR GRIPS



FLEXIBLE COUPLING



TRIP-PROOF CROQUET STAKES

TIRE FOR COASTER WHEELS

GYM RINGS

RUBBER EDGING FOR SANDBOX

PROTECTING SLEEVE FOR ELECTRIC CORD

POPULAR SCIENCE MONTHLY

Mechanics and Homebuilding

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Ticking of Clock Helps Keep Puppy Quiet While You Sleep

To KEEP a new puppy quiet the first few nights away from its mother, try putting a small mechanical clock under its bedding. This has worked several times for me. Why? I'm not certain, but the way I figure it the puppy is happy with the clock because the ticking must sound like the heartbeat of the mother. – *Harry Allison, Jackson, Mich.*

Drawing on Mimeograph Stencil

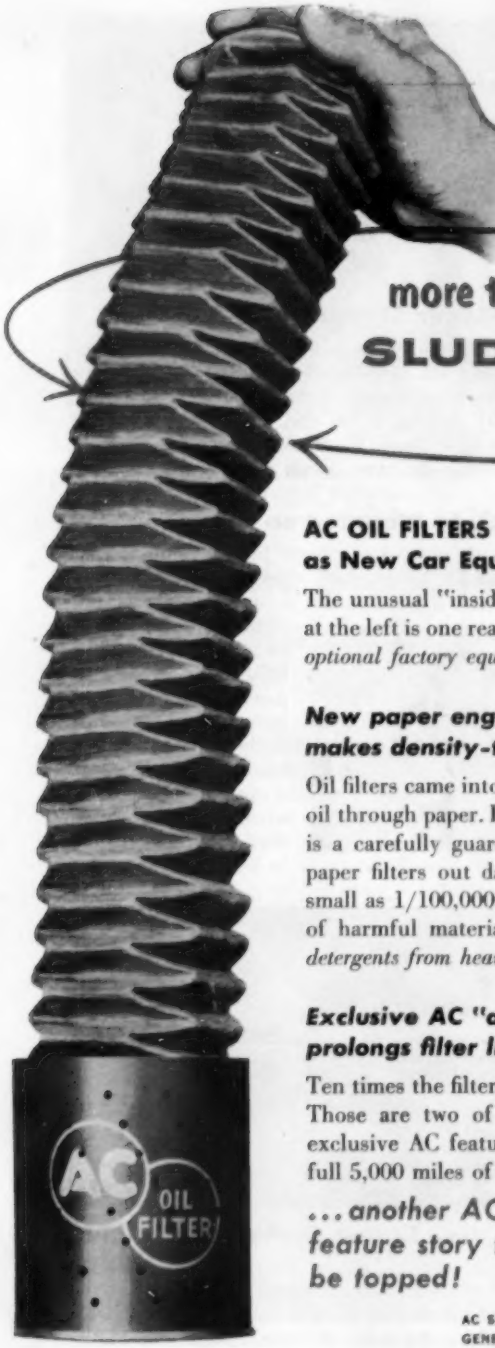
FOR drawing lines and illustrations on mimeograph stencils, or for signatures, a ballpoint pen does a better job than the regular stylus which may rip the stencil. You don't need to use an old cartridge; the ink won't affect the stencil.–*Harry Nelson Webster, Nutley, N. J.*

Bicarb Marks on Blueprints

You can mark blueprints with a clean pen dipped in a saturated solution of bicarbonate of soda. Let the marks dry without blotting and they bleach white.–*Frank A. Javor, North Bergen, N. J.*

Bike Lock Theftproofs Gas Can

A CAN of emergency gasoline, held to the side of a pickup truck by a bicycle U-bolt lock, is proof against theft. Set the can in an L-shaped frame of two-by-fours bolted to the running board, and drill the lid and truck body to take the U bolt. When you lock it from inside the body, neither lid nor container can be removed from running board.–*William H. Wilde, Los Angeles.*



—great engineering triumph and important extra protection for engine parts!

more than 90 SLUDGE-TRAPPING POCKETS

AC OIL FILTERS *top all makes* as New Car Equipment

The unusual "inside story" of AC Oil Filter construction pictured at the left is one reason why *AC OIL FILTERS today are standard or optional factory equipment on more new cars than any other brand.*

New paper engineering pioneered by AC makes density-type filter obsolete!

Oil filters came into their own when engineers found a way to filter oil through paper. How AC treats its own custom-engineered paper is a carefully guarded trade secret. But, this specially processed paper filters out damaging dust, dirt, grit or specks of metal as small as 1/100,000th of an inch . . . traps as much as 1¼ pounds of harmful material in 5,000 miles of driving. *Will not remove detergents from heavy-duty oils!*

Exclusive AC "accordion fold" increases filter area—prolongs filter life!

Ten times the filtering area! More than 90 sludge-trapping pockets! Those are two of the benefits of AC's "accordion fold." This exclusive AC feature provides better filtering action through the full 5,000 miles of driving between filter changes.

. . . another AC feature story that can't be topped!

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GENERAL MOTORS CORPORATION
FLINT, MICHIGAN

GM GENERAL MOTORS

AC OIL FILTERS

AC ENGINEERING WITH GM RESOURCES CAN ALWAYS BE LOOKED TO FOR LEADERSHIP

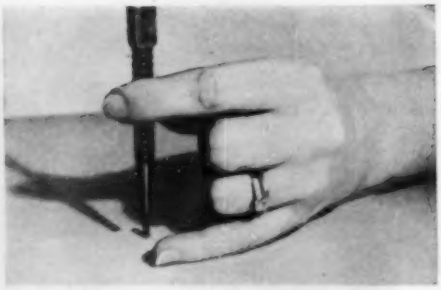
Handle Made from Broomstick

You can carry a bushel basket with one hand if you make a handle for it. Notch a piece of a broomstick at each end and slide it under the wire grips, as shown in sketch.—*R. M. Woodbury, Natick, Mass.*

Lemon Removes Linseed Oil

You probably have noticed that the odor of linseed oil remains on your hands after you have used it to apply a finish to a wood project.

If you find the odor objectionable, you can remove it by rinsing your hands in lemon juice and then washing with soap. It works for other odors too.—*Carl H. Hubachek, East Haven, Conn.*

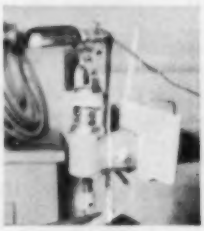


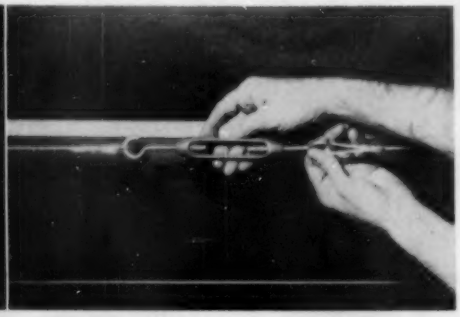
Finger Steadies Nail Set

If you want to keep a nail set from slipping off a nailhead and digging into your work, use your little finger as a support. By resting it on the work, you shift the weight from the nailhead to the finger.—*Frank A. Javor, North Bergen, N. J.*

Light Mounted on Jigsaw

A sewing-machine light having a ring holder gives good direct light on jigsaw work if you mount it on the head of the jigsaw. The holder, available with the light fixture at sewing-machine shops, may have to be adapted to fit the jig head. A yoke blade rack on the arm is an additional aid. —*James Matthews, Fort Worth, Tex.*

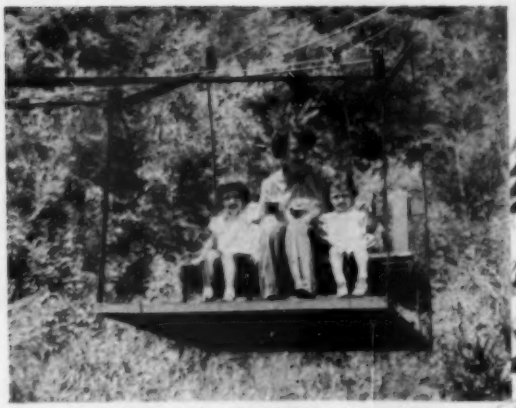




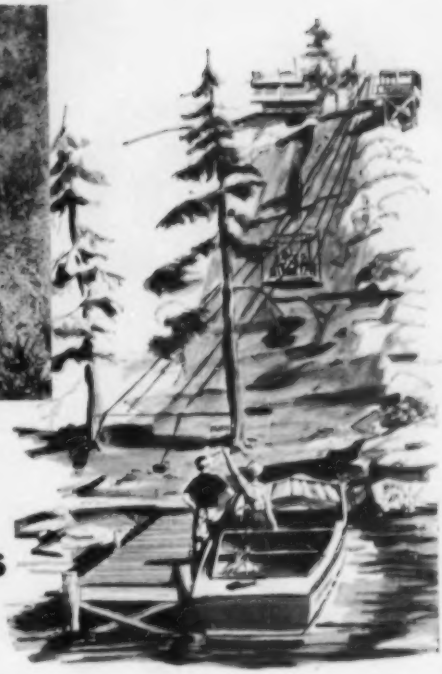
Turnbuckles and Aluminum Clothesline Clamp Bulky Gluing Jobs

Rectangular, triangular or irregular shaped objects can be held for gluing by using aluminum clothesline, turnbuckles and pieces of 1¼" hardwood doweling.

Cut notches in the dowels to fit the edges of the work and protect them from the wire. With a round file groove each dowel to prevent the wire from slipping off it. The turnbuckle should have a sufficient take-up to tighten the wire—6" should be ample. With the dowels in place, tighten the wire to proper tension.—*E. L. Britt, Westport, Conn.*



CABLE CAR framed from ¼"-by-1½" flat iron runs on ball-bearing pulley wheels. Deck-level platforms at both terminals make boarding easy. A switch at either terminal starts the car.

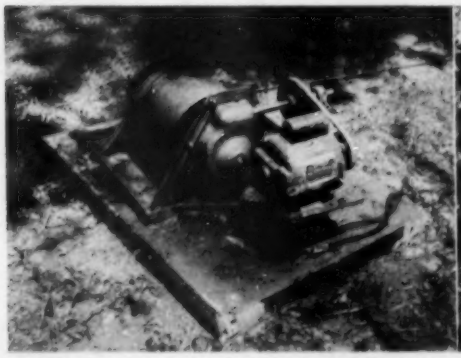


Automatic Switches Control Cable Lift

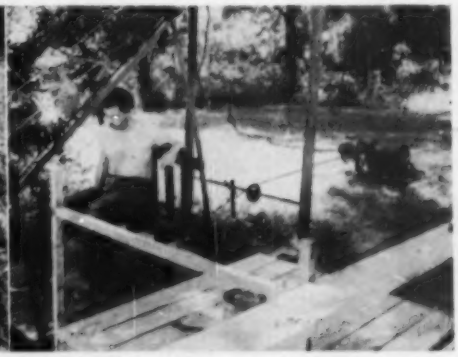
GETTING from our boat to a summer home atop a 125-foot river bank is no longer a tiring scramble. An aerial cable lift carries us up and down.

Limit-travel trips on the main cables flip a reversing switch to neutral to stop the cable car at the end of each run. Should the switch fail at the river platform, a one-way clutch on the jeep-type winch drive keeps the cable from rewinding on the other side of the drum. At the top of the lift, a safety switch is automatically tripped if the reversing switch fails. Should the power go off, the worm-and-gear drive stops cars instantly.

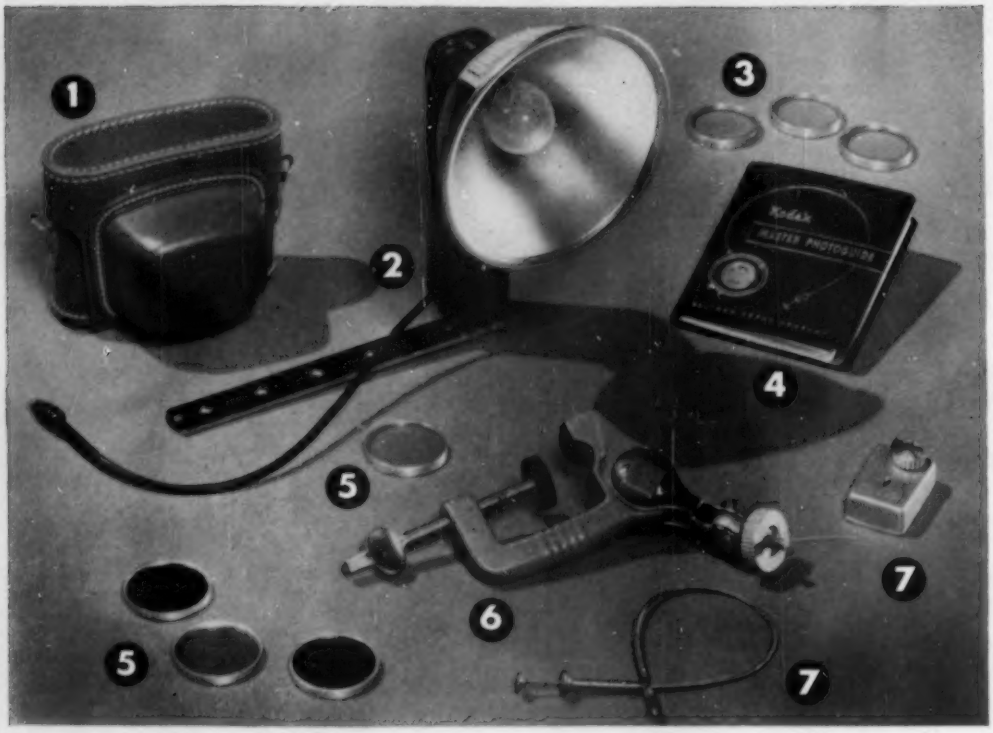
We also installed a horizontal handbrake lever directly above the car seat. Tugging it down puts a squeeze between the pulley wheels and the main cables.—*Claud Dry, Athens, Ohio.*



CONCRETE BASE anchors the winch. Two 12" cultivator disks, with a 12" piece of 10" pipe welded between them, form the drum. Power is applied through a jeep drive.



IDLER PULLEY with a tapped hole moves along a threaded rod, feeding the cable to the drum and playing it out evenly, in the same way that a sewing-machine shuttle feeds thread.



7 good ways to get better pictures

Good pictures generally don't "just happen." They're good because someone *planned* them to be good—and took pains to carry out that plan. Here are some suggestions on the use of picture-taking equipment you'll find at your dealer's that can help you make sure all your shots this summer are good ones. Take a few pains—get some great pictures!

Protect your camera

When you start out with your camera in search of good pictures, the fun goes out of it a little if the camera isn't protected by a carrying case. You have to be extra careful because you have a precision instrument in your hands. And this restricts your movements—particularly if you're hiking or taking off in a car. And when you put the camera away, you have to look for a specially safe place for it. A good carrying case—at least the way Kodak makes them—is engineered not only to protect vital parts of the camera against shock but for convenience and ease of camera operation. They're of finest materials and give your camera a smart, professional look. Kodak cases, designed for Kodak cameras, begin at $2.65.

Flash for punch

As you thumb through the current copy of your favorite illustrated weekly magazine, ask yourself what makes so many of those pictures so "snappy" and professional-looking. Chances are that—in close-ups especially—flash had something to do with the *punch* these pictures always seem to exhibit. So, do some thinking about *flash*—particularly for filling in shadows in direct daylight shooting. You

could scarcely invest less money—and reap more benefit—than in acquiring a flash unit like Kodak's Standard Flasholder, with its brilliant Lumaclad reflector and its universal bracket for attaching to any camera with a tripod socket. And, with simple adapters, it can be made to operate practically any flash shutter. It's only $7.95 (batteries a few cents additional).

3

Get closer!

There are all too many snapshots in the world where the subject—someone's pet dog, or the baby, or a small, inanimate object—is "lost" somewhere in the middle of the picture with acres of space surrounding it. "Fill the picture with the subject" is a good rule to go by. And if you're shooting a relatively small subject—like the baby's face or even the fishing lure you just tied for yourself—then reach for your Kodak Portra Lenses. These are auxiliary lenses you slip over your regular lens and which *magnify* your subject, nicely filling your negative full of *subject matter* rather than *space*. Available in a choice of "magnifying powers," Kodak Portra Lenses range from $2.65 up, in sizes and with adapters to fit almost any lens.

4

Photographic Professor

We'll admit that not even the most experienced and proficient photographer could store in his memory *all* the film and picture-taking data and calculations one might ever need. This is why the Kodak Master Photoguide was devised. It's like having an expert at your elbow to provide you with exactly the right shutter and lens aperture setting to use, regardless of light conditions and for any of the several films you might be using. You will profit greatly by getting one of these vest-pocket guides (only $1.75) and keeping it with you. There is scarcely a question about a given picture with a given film under a given light condition which it can't answer—right on the spot!

5

Filters for realism

When placed over your camera lens, a filter can improve the realism of almost any black-and-white picture you take. Kodak Pictorial Filters, available in yellow, green and red, are easy to use and inexpensive (from $1.50). A yellow Pictorial Filter emphasizes clouds and contrasts a light object or figure against the sky. A green Pictorial Filter is used for natural reproduction of blossoms and foliage and for outdoor portraits against the sky. A red Pictorial Filter provides highly dramatic blue sky-white cloud contrast.

There are some useful filters for Kodak color film, too. One is the Skylight Filter (from $1.75) which reduces bluish haze found on overcast days or in the shade. Others are filters which permit you to use certain outdoor types of Kodak color film indoors and indoor types outdoors—a great convenience when you want to buy one roll of color film and use it both indoors and outdoors. The exact filter to use and the exposure data are found in the instruction sheet packed with your color film.

6

Steady, brother!

With today's fast film and fast shutters, the usefulness of the good old tripod is sometimes forgotten. Well, if a tripod is just too much to carry around, give a thought to the Kodak Flexiclamp—which you can slip into a coat pocket! It is basically a tripod screw swivel-mounted on a padded "C" clamp which will open as wide as 2 inches to clamp on anything from the back of a chair to a garden gate! Use it for time exposures of any kind, of course. But use it, too, for *any* picture which takes careful composition—from landscapes to table-top shots. Costs only $5.95.

7

Get into the picture!

It is often pointed out that the least-photographed member of any given family is the one who takes most of the family pictures. Seems logical. Well, if that means *you*, and your camera shutter can be operated by a cable release, you can change all this by utilizing a Kodak Auto-Release ($3.86). It's merely a delayed action "trigger" which takes your place at the camera while *you* get into the picture. Simply attach the Auto-Release to your camera using an ordinary cable release (a 7-incher costs only $1.25). You press the button and walk into the scene. The Auto-Release waits about 10 seconds—and then snaps the picture!

Prices are list, include Federal Tax where applicable, and are subject to change without notice.

Kodak
TRADE-MARK

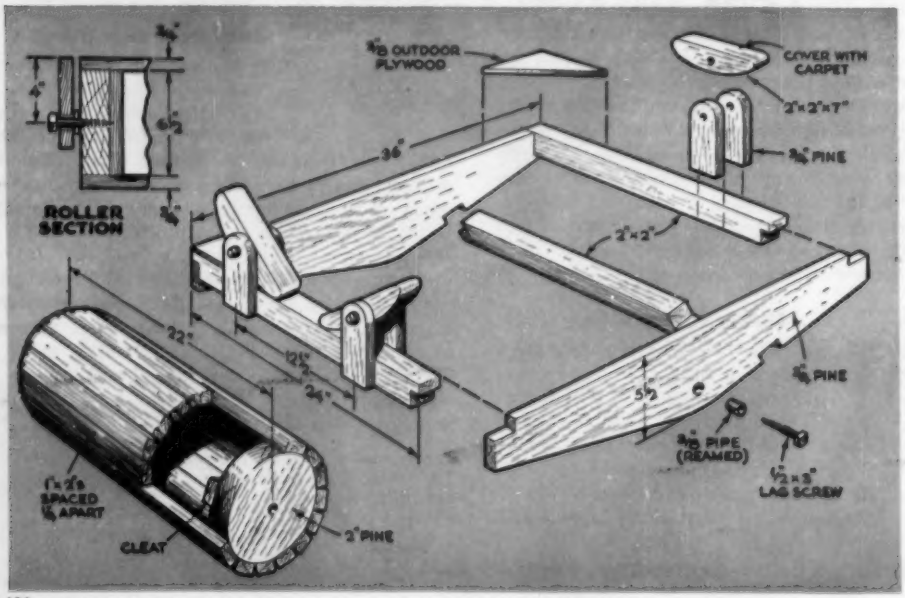
Eastman Kodak Company, Rochester 4, N. Y.

Boat Dolly Rolls Over Sand

GARTING a boat down to the beach is easy with this sure-footed dolly. The big, single roller rides smoothly over soft sand where wheels might dig in. And to launch or beach the boat, you just roll the dolly right into the water.

I made mine for an 8′ dinghy, but for larger boats you can scale up the dimensions accordingly. The roller is just a series of 1″-by-2″ furring strips nailed around two circular endpieces. Two large lag screws are run through the sides for bearings, and are then screwed into the ends of the roller.

For heavy boats, you can run a pipe through the roller to make a stronger axle. Also substitute two-by-sixes for the sidepieces and two-by-fours for the crosspieces instead of the 1″ stock I used. —*Hi Sibley, Nuevo, Calif.*



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[*Continued from page 85*]

way. "How did he get it over here?" he asked.

"Push start."

"How did it sound when it was running? Any signs of missing?"

"Nope. Sounded good."

"What have you done so far?"

The young mechanic ticked off on his fingers: "Plenty of gas at the pump and the carburetor. No sign of an intermittent stoppage. Not hot enough for vapor lock. Checked the points and the condenser. No trouble there. Plugs are okay."

"Did you check the coil and plug leads to see if there was a break in the continuity?" Gus asked.

"Will do," said Stan and he returned to the front of the garage. Gus watched him fondly. Stan had come a long way since that day in—when was it now? He recalled vividly the day Stan had come to work for him. He began looking through the bills. Yes, here it was. November 15, 1943. Stan's boyish signature on a service order. Yes, sir, he had become quite a mechanic.

Gus was aware that someone was reading over his shoulder. He looked up and saw Jerry Corcoran, the state trooper, still in his uniform.

"Hi!" said Gus. "Say, I thought we were going fishing. Why didn't you get into your old clothes?"

JERRY hesitated. "Well, you see—well, I can't go just yet. I'm—well—I'm sort of still on duty."

Gus couldn't hide his disappointment. "You mean no fishing for us today."

"That's about it," Jerry said uncomfortably. "Not for a while, anyway." Gus started to get up.

"What are you doing?" Jerry asked him quickly. "Going through some old records? Let me see some of them."

"You wouldn't be interested in these," Gus said.

"Oh, yes I would," Jerry said, seating himself beside Gus. "Do you remember the time—it must have been 10 years ago—when you and I were fishing and the gypsy stole your battery right out of your car?"

Gus laughed. "He thought we couldn't catch him without a battery."

"But you wrapped the cable with your handkerchief to keep it from shorting. I gave you a push to get the car started, the generator furnished ignition juice, and we caught up with the thief. Was he ever surprised!"

Stan Hicks appeared again. He was flushed, covered with grease, and worried. He exchanged a glance, which Gus didn't see, with Jerry Corcoran.

"I checked the plug leads and there's no break in continuity," he said. "What do you suggest I do now?"

"I suggest I take a look at it," Gus said.

"No!" both Stan and Jerry exclaimed together. Gus looked at them.

"What's the matter with you guys?"

"Nothing," Jerry said.

"Nothing at all," Stan rejoined hastily. "I'll take a look at the coil. That's probably where the trouble is." And he darted away. Gus made as though to follow him, but Jerry said, "How far back do these records go?" and in another minute Gus had forgotten the customer out front as he and Jerry dug into the old files.

"HERE'S a good one," Gus said, holding up a bill dated July 20, 1930. "Twenty-five years ago. Do I remember this fellow! He had bought a gadget that was supposed to increase gas mileage by letting more air into the manifold. He kept stalling on hills and came in to me to find out what was the matter. I told him what was wrong with his gadget and then—" Gus laughed—"and then I looked into my crystal ball and told him that it would be impossible to invent something that would automatically lean out or richen the mixture."

"But isn't that sort of what an automatic choke does now?" Jerry asked.

"Yup," said Gus. "I hope I'm a better mechanic than I am a prophet."

Jerry held up a bunch of bills which

[*Continued on page 194*]

Add a beautiful extra room at low cost

1. **It's easy and economical** to turn unused attic, basement, and porch areas into extra living space with Armstrong Temlok® Tile and Plank. These do-it-yourself materials save you money because they build, decorate, and insulate in one simple operation. After the room is framed, nail up and level 1" x 3" furring on 12" centers.

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[*Continued from page 192*]

were beginning to get brittle and yellow. "These go way back."

Gus thumbed through them. "Nineteen twenty-five. H-m-m. December. October. August. July." He paused at the last bill in the pile. He looked up at Jerry. "Well, what do you know!

"Today is an anniversary! This is—why, this is my thirtieth year in business here. Look." He proffered the bill he was holding in his hand. "See? The first Model Garage bill. It was for Mr. Stevens. Tune-up and checking over his car before he went on a trip. I remember it as clear—" He looked at his friend, and stopped. Jerry's face was contorted with mirth. He was struggling to keep from laughing. "What in tarnation is the matter with you?" Gus demanded.

At this juncture Stan Hicks reappeared for the third time. "Do we have a distributor for a '41 Buick?"

"Nope," Gus told him. "Haven't you found that fellow's trouble yet?"

"It must be his distributor."

"I'll take a look at it," Gus said.

"Oh, no!" Stan began in a panic, but Jerry Corcoran interrupted him.

"It's no use, boy," he said. "Gus has just discovered that this is his anniversary. We can't stall him off any longer."

Gus looked from one to the other sharply. "What are you two talking about? What are you up to?"

Stan said, "Ulp!" and darted away. Jerry took Gus by the arm. "It's about this thirtieth anniversary of yours."

"Yes?" said Gus. "What about it?"

"You were the *last* person in town to know about it."

HE GUIDED Gus firmly through the stock room and the garage. Gus could see what looked like a lot of cars and people out front. As he appeared in the doorway, a tremendous cheer broke out. Gus stopped, blinked his eyes and looked again. Stretching from his garage as far as he could see down the highway were cars, covered with streamers and bunting, interspersed with floats. And people! The whole town seemed to be there. And they were cheering him; waving their hats and calling his name. Signs on the cars and floats read: YEA, GUS! and THE FIRST THIRTY YEARS ARE THE HARDEST, and there were others.

The mayor, resplendent in a cutaway coat (slightly too large) and a silk top hat (slightly too small), was smoothing his waistcoat, mopping his forehead, and trying not to look as if anything had gone wrong. Behind him were half a dozen of the town's leading citizens. The mayor stepped forward, something in his hands. The crowd fell silent.

"Mr. Wilson," the mayor began, in his best oratorical manner, "in behalf of the citizens of our town—" He paused and looked helplessly about him. All at once he dropped the formality. "Oh, for the love of Pete!" he exploded. "Gus, it wasn't supposed to be like this. We had planned to whisk you into my car, lead the parade downtown, and make the speeches and presentation there."

"Speeches?" asked Gus, now completely bewildered.

"Yes, you old son of a gun! This is your day. I have officially proclaimed this Gus Wilson Day, in honor of the town's No. 1 citizen. And to commemorate it we want to present you with this plaque of old-car emblems for your office wall."

A cheer broke out as Gus dazedly accepted the plaque from the mayor. Someone hollered for a speech, and the crowd took it up. Gus demurred, but the mayor and Jerry Corcoran led him firmly to a bunting-covered truck and hoisted him up.

FOR a moment, Gus stood there. His eyes were moist as he looked down at his feet and shifted his pipe in one work-worn hand. Finally he looked up and squared his shoulders.

"Friends and neighbors," he began. "This is a great honor you have bestowed on me. This kind of a turnout doesn't usually happen except at a funeral, and

[*Continued on page 196*]

Here's how fresher air makes your Chevrolet strong

. . . says Ed Cole, Chevrolet Chief Engineer

MAYBE it's an odd way to put it, but it's almost literally true—the design that gave the 1955 Chevrolet its High-Level ventilation system also let us build a better body.

I'd like to explain this because it illustrates the very real benefits you get from engineering that makes one structure do the job of two.

We put the ventilation intake in the cowl, right at the base of the windshield, to pick up fresher air, above the level of road dust and fumes. This air goes into a plenum chamber, which is just an engineer's name for a reservoir or box that smooths out wind gusts to produce an even flow of air to the passenger compartment (and also drains out any stray raindrops).

We could have just hung this box inside and let it go at that. Instead, we designed a specially shaped chamber and *welded* it to the cowl and body metal to form a double-walled arch, as you see in the drawing above.

So the plenum chamber does a double job now. It delivers a *smooth* flow of outside air. And it also is a key structural member, a husky reinforcement that adds to the rigidity of the whole car. That's why the 1955 Chevrolet is so rigid and shake-free. Your dealer can show you just what this means in a demonstration drive, so why not make a date with him now? . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

motoramic

Chevrolet

CHEVROLET

[*Continued from page 194*]

I don't think I'm dead yet." That got an appreciative laugh. "Though I liked to have died," he went on, "when I stepped out and saw all you people standing here. I knew business had gotten better, but I didn't think it was that good.

"Seriously, though, 30 years seems a long time when you look back, until you think of them as being years of friendship and accomplishment. Then it isn't long enough. I've made a lot of friends since opening the Model Garage. I've learned a lot about people and a lot about cars. Cars are like people, you know. Treat 'em right and they'll seldom let you down. That's all I have to say, except—well—thanks a lot!" The crowd applauded wildly and Gus jumped to the ground. The mayor shook his hand.

"Terrific, Gus!" he exclaimed.

"Thanks."

"Now there's just one thing . . ."

"What is it?" Gus asked.

"Do you think you could get my car started so we can get on with the parade?" Gus joined in the laughter.

"It serves you right," he said, "for entering into this conspiracy. I might have known there was something fishy when you wanted your car tuned up on the Fourth of July. And I should have suspected that Stan Hicks was up to something this morning."

Stan colored with embarrassment. "I thought I could fix it," he said, as they walked to the mayor's car at the head of the line. "But it's a real stumper."

Someone in the crowd yelled, "Maybe it's out of gas."

When the laughter had subsided, the mayor retorted indignantly, "Even I've got enough sense to check that."

MEANWHILE Gus was going over the ignition system with sharp eyes and deft fingers. "The spark at the coil is weak, but there is one. H-m-m. Sure looks like distributor trouble."

"Then we're sunk," said Stan.

"Help me pull this distributor," Gus ordered. "I have an idea." The two men worked swiftly while the crowd gathered.

Even as he worked, Gus sensed something in the air. A feeling of excitement. This was a challenge. On his thirtieth anniversary—on Gus Wilson Day—he was being given a real test of his ability. Gus was the champ defending his crown and the whole town was out to watch him do it. A tingle of excitement ran up Gus's spine. Would his hunch work? Would he vindicate the townspeople's faith in him? Somehow he knew he must or it would spoil the day.

In a very short time the distributor was stripped down. Gus examined it thoroughly. Then his heart gave a little extra beat. Luck was with him!

"I think we can fix it," he muttered. Word was passed along, and a cheer went up. "Bring me a shim," he told Stan.

A FEW minutes later the distributor was back in the car, the engine was purring like a baby, and the parade was at last under way. Stan and Gus were sitting in the back of the mayor's car. Amid horn honking, shouts, laughter, and general merriment, Stan leaned over to Gus: "You're still the old master."

"Thanks, son," Gus replied.

"What was it?" Stan asked. "Or is it a professional secret?"

"Not at all," Gus said. "What happened was that the shaft on which the rotor arm sits was worn. When the distributor was moved in retiming, the rotor arm settled back so low that it didn't get the spark to the cap studs at cranking speeds. At least that's what I guessed. So I put the shim in, lifting the rotor arm a trifle. It did the trick."

They rode along without speaking for a while. Finally Stan said, "I hope you won't have to wait another 30 years for another day off."

Gus chuckled. "You know, when you like what you do for a living as much as I do, every day is a holiday." END

NEXT MONTH: Gus wrestles with a balky power mower.

Here's what HERTZ RENT A CAR found out about Car-Plate –

Easiest way to put on the toughest kind of wax

EVEN AFTER 3 MONTHS– CAN YOU PICK THE CAR-PLATE WAX SIDE FROM THE HARD-RUB AUTO WAX JOB?

HERTZ picked 20 of its rental cars in cities across the U.S. One side of each was waxed with liquid Car-Plate, the other with one of three well-known paste waxes.

HERTZ FOUND: *Car-Plate is far faster, easier to apply than any paste auto wax.*

After months on the road, the sides were compared for wear and shine.

HERTZ FOUND: *Car-Plate lasts as long as the most durable paste auto wax.*

The reason: all the Car-Plate Wax *stays on* your car—you don't rub wax *off* as when polishing paste wax. The Hertz test car shown here was driven 3 months, then simply washed and photographed. If you can't tell the Car-Plate side (right) from the paste side, why waste hours rubbing? Next time wax with Car-Plate!

Before waxing use Car-Plate Cleaner. Wax will bond perfectly in a brilliant, long-lasting finish.

JOHNSON'S CAR-PLATE WAX

Car Built on Velocipede. When Walter U. Garstka's son lost interest in his tricycle, the Denver craftsman converted it into a three-wheel auto. The body, made of plywood and pine, sports a dashboard with instruments from a junk yard, a bulb horn and headlights (tin cans rimmed with canning-jar screw rings) operated by a six-volt flashlight battery. Its open trunk is handy for groceries or toys.

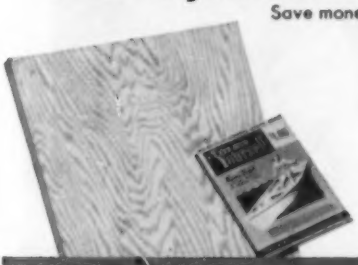
CRAFTSMEN AT WORK

Tandem Mowers Do Double Work. G. Wilbur Raymond of Darien, Conn., found that by trailing his power mower with his old hand mower, he halved lawn-cutting time. The towed mower (handle discarded) was attached by an angle-iron bracket bolted to the right frame of the power mower, a loose pin, steel-rod V and two auto-brake clevises. For added traction, the roller was replaced by steel shafting.

Phono Motor Stirs Photo Mix. Using the motor from an old phonograph, Richard C. Carpenter of Dundee, N. Y., built an efficient mixer (below) for his photographic solutions. Rod and stirrer, bent from glass, are held to the motor shaft by a brass pipe union drilled and tapped for setscrews.

5 do-it-yourself ideas for week-end carpenters

Save money—have fun with Easi-Bild* patterns and Weldwood Fir Plywood

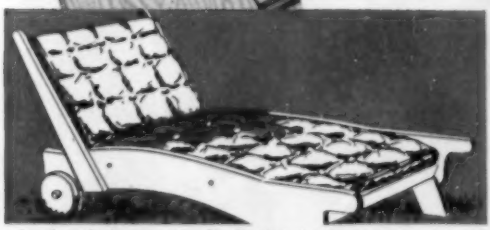


Here's a happy combination that makes do-it-yourself easy, quick and satisfying!

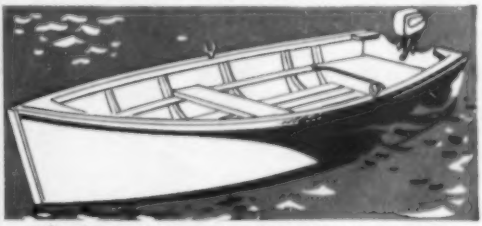
With Weldwood Fir Plywood you can build any of these projects. Make things for the house – even *make* a house!

Most patterns are full size – all contain famous Easi-Bild step-by-step directions and pictures plus detailed list of materials. Your lumber dealer can furnish the exact amount of superior Weldwood Fir Plywood you'll need. And chances are he'll have all the other materials, too.

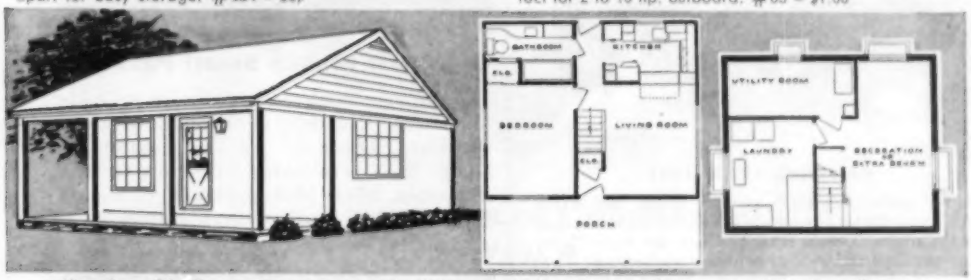
Get started today – send the coupon now!



Garden chaise on wheels. Comfortable, relaxing; comes apart for easy storage. #324 – 35¢



Utility boat. 11½-footer handles well with oars, is perfect for 2 to 10 hp. outboard. #85 – $1.00



Vacation cabin. Compact yet roomy, contains living room, kitchen, bedroom, bath on entry floor; lower floor has recreation room or second bedroom, laundry and utility rooms. Plus 300 sq. ft. of attic storage! #432–$3.00

Storage wall on wheels. Divides bedroom or sleeping area in den or spare room. #263 – 50¢

Swimming float. Ride with the waves! "Seascope" window can be fitted to view marine life. #247 – 50¢

*Trade-Mark Easi-Bild Pattern Company

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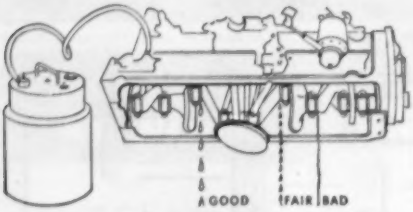
Care and Feeding of Engines

BY S. P CORP

WORN BEARINGS WASTE OIL

Even a brand new Sealed Power KromeX Ring Set can't keep worn or cracked bearings from wasting oil. A main bearing clearance of .0015" will allow enough oil to discharge through the side of the bearing for lubrication. If clearance wears to .003", five times as much oil is discharged. If clearance wears to .006", discharge is 25 times as much as that of a normal bearing. Pistons and rings can't control such a flood of oil.

Worn connecting rod bearings will discharge a large amount of oil directly onto the cylinder wall, flooding rings designed to take care of a normal oil flow.



BEARING LEAK TEST

To test for bearing leaks, remove oil pan and attach an oil pressure tank to the oil gallery between oil pump and bearings. Use an SAE 20 oil, under 20 to 25 lbs. pressure, and check oil drip from each bearing. 15 to 20 drops per minute is desirable. 30 to 120 drops per minute is serviceable. 120 to a stream is excessive and corrections must be made to bearings or shaft.

Turning the crankshaft during this test will indicate an out-of-round condition of the shaft if the oil drip varies.

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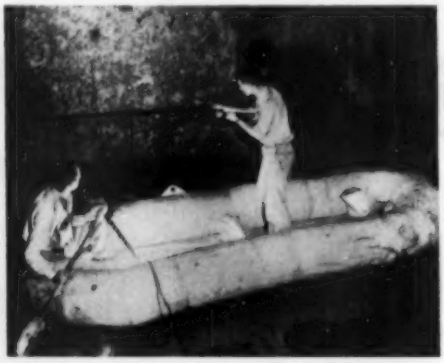
Thousands of car owners already have their free copies of Sealed Power's new illustrated handbook, "Care and Feeding of Engines." It's crammed with useful, easy-to-understand, money-saving helps on car care. Send a postal card request for your copy today! And when you re-ring, be sure to use Sealed Power KromeX Ring Sets—for quick seating, fast break-in, immediate oil control, and long, long service. Sealed Power, Dept. H-7, Muskegon, Michigan.

Sealed Power
PISTON RINGS

Big Chair Makes Small Package

THIS lightweight aluminum chair folds into a case that rides easily slung over the shoulder. Opened, it's a comfortable lounge chair, adjustable for position. Leisure Industries, 96-09 Metropolitan Ave., Forest Hills 75, N. Y., makes the Minifold.



They Cruise on a Private Sea

Two men on a raft in the Saudi Arabian desert—that's what you see above. They're hunting corrosion in an emptied oil tank. After each trip around the steel bubble, these Arabian American Oil men raise the water level to float the raft higher.

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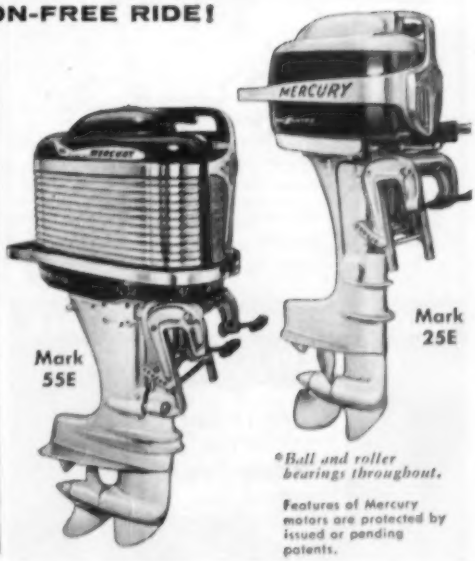
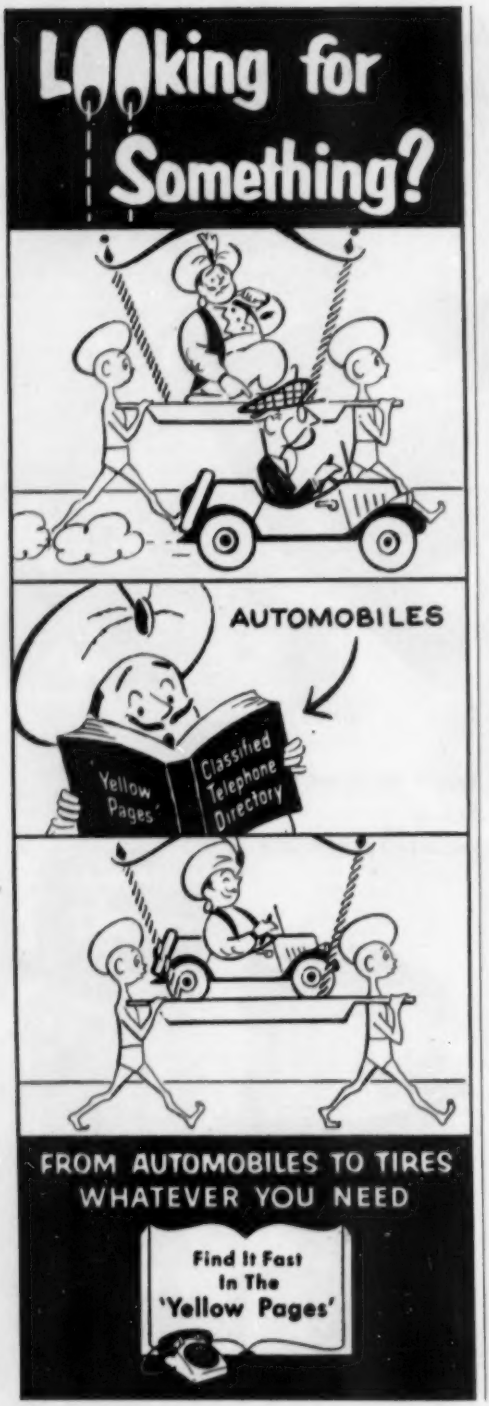


*Ball and roller bearings throughout.

Features of Mercury motors are protected by issued or pending patents.



The Life and Times of Gus Wilson
[*Continued from page 88*]

stating that both Gus and Joe were real men, running a garage in a small town near New York City. Their names were changed, it was reported, as a condition of detailing their experiences. In one of these articles, appearing in 1930, Gus's prepublication history was pushed even farther back:

"Gus Wilson grew up with the automobile industry. When Duryea was experimenting with his first gasoline buggy, Gus Wilson, then a young man, was investigating and incidentally overhauling one of those funny little steam vehicles that had to stop at every horse trough. . . . When the first electric hansom cab hummed and groaned its snail-like course over the streets, Gus was adding water to the batteries, sandpapering the commutator, and otherwise mothering these clumsy vehicles. His wrist is still stiff because the huge one-cylinder engine of a Northern runabout kicked back and broke several bones . . ."

Based on the Duryea clue, simple arithmetic would make the old boy around 82 years old now. Since this is clearly improbable, research has been conducted into dusty files and elderly memories. The answer: there was indeed a prototype Gus long ago. For those who ask about him now, the only fitting reply is, "What do you want, chimes?"

Old friends. Around the garage, from the Thirties on, there gathered a few regulars once described by Martin Bunn as the "Model Garage Debating Society." There was Doc Marvin, general practitioner and boon companion; Ezra Zacharias, the rural mail carrier; Silas Barnstable, a magnificent tightwad; and old Doc Hockenjoss, a fragrant and whimsical veterinarian. State Trooper Jerry Corcoran showed up in 1939 and, aided by Gus's frequent help in nabbing malefactors, won his sergeant's stripes in 1950. Harry Godfrey was grease monkey for some years, but he enlisted a few months before Pearl, just as Gus had brought

[*Continued on page 204*]

Lazy-Susan turns wasted corners into handy storage space!

get complete detail drawings and directions in

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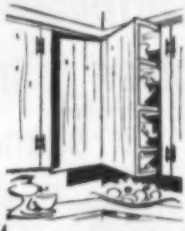
—along with the picture-packed booklet, "Friendly Home Ideas in Western Pine." Write for it to Western Pine Association, Dept. 307-L, Yeon Bldg., Portland 4, Ore.



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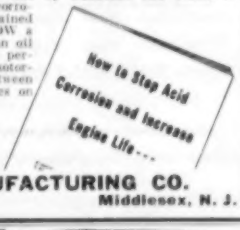

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The Life and Times of Gus Wilson
[Continued from page 202]

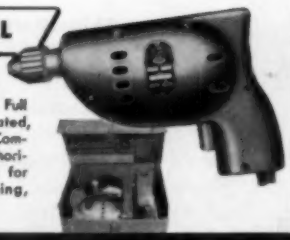
him along to be a fine mechanic. In 1943, a timid 15-year-old began helping out after school; his name was Stan Hicks. Gus promoted Stan to full-time mechanic in 1948, and Greg Jones took over the pumps and grease rack.

There were also many regular customers; Agatha Tarlin, who baffled Stan by demanding "petrol"; Mr. Spinker, who loathed people who didn't get his name right; Jason Evants, who wore sneakers and thought his car was fond of him; Senator Bombey, who gave cigars only to persons of voting age; Mrs. Miller, who always made Gus happy that he was a bachelor; and Kiskum, a Bohemian with an odd accent ("Me displeased person—displeased by landlord—no kesh!").

Over the years Gus has occasionally given glimpses into his unrecorded past. He was wounded in World War I ("I didn't duck quick enough"), and he did some successful motorcycle racing in the early Twenties. Once in 1930 he helped a youth hot up what seems to have been a Stutz so that it won a back-road scratch race. His mechanical skill isn't limited to autos; he has deftly repaired a number of trucks and tractors, a fire engine, an airplane, a motorcycle, a cabin cruiser, an outboard motor, and a power lawnmower.

Joe was here. Martin Bunn has conspicuously not reported on Joe Clark recently. But Joe is—or was—both half owner of the Model Garage and for more than a quarter of a century Gus's best friend. Joe was last seen in June, 1949, when his nephew took him for a plane hop and the weather closed in so suddenly that only frantic work by Gus and Jerry Corcoran got them down safely. It may be that Joe has retired to Florida, comfortable on his half of the modest but steady profits. Or it may be that Doc Marvin, finding that he has a bum ticker, has told him to take things easier. In any event, Joe is alive and well somewhere. In the bright and busy world of the Model Garage that is assured. END

1/4" ELECTRIC DRILL



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Fast, powerful, light, dependable—orbital action. At 4,000 cycles per second produces fine finish on all woods, metals, fibres, etc., wherever hand sanding is usually employed.

The SIOUX name needs no introduction to the skilled mechanic who makes his living working with power tools. In the aircraft and automotive fields and in industry they're the tools the professionals have used for over 40 years!

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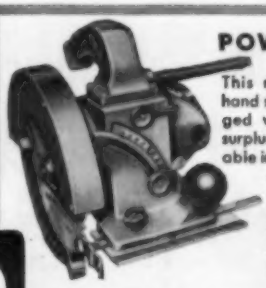
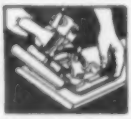
POWER SAW



This modern *SIOUX* hand saw is really rugged with a world of surplus power. Available in 8¼", 7½" and a 6½" Model that will saw through 2 x 4's at a 45° angle with plenty of blade to spare.

Mitre Cuts—Adjustable base for bevel cuts from 0 to 45°, to 1 11/16" depth. Spring lift with nut adjustment is quick, accurate.



Cross Cutting—Edge of base follows line. High speed makes it many times faster than hand sawing.

Rip Sawing—Adjustable rip scale guide is plainly graduated in fractions of an inch. Blower keeps line of cut free of saw dust.

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THE PLIER DESIGN THAT OBSOLETES ALL OTHERS

CHAMPION DeARMENT TOOL CO. • MEADVILLE, PA.

Littlest Ships Battle Super-Storms

[Continued from page 109]

(Eire) boat, do what he did last November 27, Thanksgiving weekend.

Walsh sailed right into an Irish Sea gale ("of exceptional violence," the Royal National Life-boat Institution says) to try to rescue men from the *World Concord*, a 20,000-ton, 630-foot-long tanker, one of the world's biggest and newest ships, less than a year old.

Coxswain Walsh faced 25-foot waves atop a heavy swell that turned the ocean into great moving hills. You will understand the strength of the waves by what they alone did to the *World Concord:* split her clean in half. Usually, when a ship breaks, it is due to a reef. Here the seas alone did it.

Walsh went after the front half of the tanker.

After dark he found it. Now his choice was whether to put his small boat back into harbor—and risk losing the position of the bow of the *World Concord*—or stay there till daybreak would permit an attempt at rescue.

He decided to ride it out, did, and the next morning got off all seven survivors.

Nobody made Captain Watts Williams of the St. David's (Wales) lifeboat do what he did that same day.

From across the Irish Sea opposite the shore of Rosslare Harbor, Williams went after the stern half of the *World Concord*.

A lifeboat skipper is perfectly free to try any means of rescue that occurs to him under the circumstances. Williams' circumstances included the same seas that Walsh was facing, almost no visibility, and a couple of gales tangled up with each other.

His boat could only stand alongside the *World Concord's* stern for seconds at a time. So Williams got the men on the tanker's stern to cling, one at a time, to a Jacob's ladder down the tanker's side. He stationed five lifeboatmen—his entire deck crew—forward in his boat. Then he made runs alongside, while the

[Continued on page 208]

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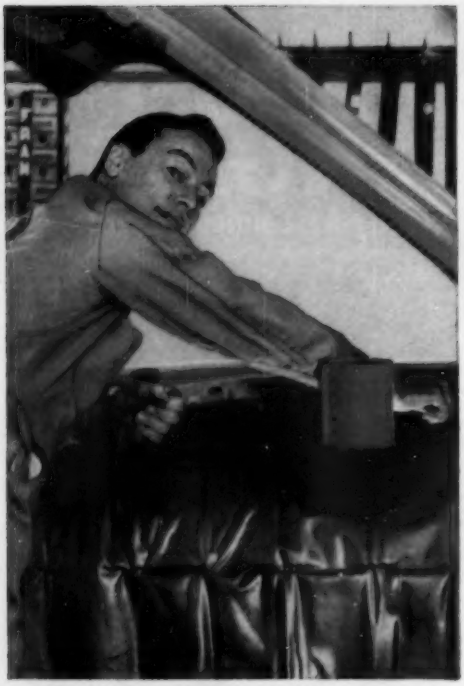
Forged from special alloy steel, extra hard P&C bits are precision ground and oil tempered. Fluted, plastic amber handles take the toughest twists, are kinder to your hands. Shock, hammer, acid and grease-proof. Knurled tips for fast finger twirling.

There's a big difference in screwdrivers. Be sure you buy P&C . . . guaranteed . . . the best tools money can buy. Look for P&C tool displays—in over 10,000 stores across the nation. Send 10c TODAY for catalog of 500 tools.

P&C Hand Forged Tool Company

DEPT. F-4 · BOX 5926 · PORTLAND 22, OREGON



Motorists prefer FRAM more than 2 to 1

Surveys prove it . . . and in many cases the preference for FRAM Oil Filters more than equals the preference for the *next two most popular brands combined!*

Here's why: FRAM is engineered for *extra-high* filter efficiency . . . *keeps* oil clean, cuts wear, saves power and reduces repair bills.

There's a FRAM Cartridge engineered for your car. See your FRAM Dealer today!

Send FRAM boxtop or 25c for big, colorful, 68 page *Vacationland America* Book describing motor trips throughout America!

FRAM
OIL · AIR · FUEL · WATER
FILTERS

FRAM CORPORATION, Providence 16, R. I.
Fram Canada Ltd., Stratford, Ont.

Littlest Ships Battle Super-Storms
[*Continued from page 206*]

crew grabbed at the sailor on the ladder.

This maneuver was repeated 35 separate times. All 35 men aboard the *World Concord's* after half were saved.

Each crew picks its own boat from six new models being offered today. Already, in this period of super-storms, 50 new boats have replaced old ones. Others are coming off the ways.

All the new boats are small—35 to 52 feet. Most popular size is 46.

"Lifeboats," the secretary of the Lifeboat Institution explains, "have to be built to go where no other boats can go. For this reason there must be a limit on their size." They must maneuver near shore and sandbanks, through rocks, or close beside wrecks like the *World Concord.*

Whatever model a crew selects, it will get a boat that is:

• ***Buoyant.*** Empty spaces are filled with small boxes of red cedar—150 to 250 of them—covered with glue, stretched calico, and paint.

• ***Virtually unsinkable.*** Holes in the bottom—really—let out all the water a lifeboat can hold in 12 seconds. One big wave can fill the boat, and today the boats meet one big wave after another, and sail all day filling and emptying, filling and emptying. The holes in the bottom contain one-way valves that prevent the ocean from coming up through them.

• ***Unstoppable.*** A lifeboat is designed to make eight knots through any kind of weather. Twin engines, in watertight housings, will run in any position but shut off automatically if a boat capsizes —so the men won't be left behind in the water. Duplicate air inlets and exhausts for each engine mean one of each is out of the water no matter what the position of the boat.

• ***Strong.*** The iron men of these little ships all ride in wooden boats. The wood, selected for strength, is teak from Burma, African mahogany, and British oak.

How tough the boats are is shown by what the skipper of the Walmer boat,

[*Continued on page 210*]

MAIL SURPLUS SALE OF HOME, FARM AND FACTORY EQUIPMENT

SELF-PRIMING
ALL BRONZE & MONEL
GEAR PUMP

ITEM #383—USE FOR:

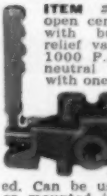
● Sprinkling ● Irrigation ● Insecticide Spraying ● Sump Pump ● Fuel Transfer ● Home Water Systems ● Dewatering ● Salt Water, Chemical, Acid Pumping

FEATURES ● Needle Bearing Construction ● 1½" Pipe Thread Inlet, 1¾" Hose Outlet ● Standard ¾" Keyed Shaft ● All Bronze Body & gears, Monel Shaft ● Equipped with Drain Cocks, Grease Cup, Steel Internal Drive Gears for long, trouble free service.

CAPACITY: From 10 to 80 Gal. Per Min. At Speeds from 550 to 2400 Rev. Per Min. Using from ½ to 6 Horse Power. For Pressures to 60 lbs. Ship. Wt. 58 lbs. U. S. Navy Cost $168.00.

F.O.B. Chicago **39.50** Ea. Two for 75.00

GROBAN
FOUR-WAY OPEN CENTER
HYDRAULIC
CONTROL VALVE

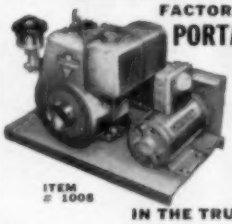


ITEM #126 — Four-way open center control valve, with built-in adjustable relief valve factory set at 1000 P.S.I. Spring loaded neutral position. For use with one double acting cylinder. In neutral position cylinder is locked and pump unloaded. Can be used as single unit or mounted in series. Has ¾" pipe thread inlet and outlet, ½" pipe thread cylinder ports. Finger grip handle. Ship. wt. 10½ lbs.

AN OUTSTANDING BUY!
F.O.B. Chicago **21.50**

To place phone orders call WEbster 9-3793

BRAND NEW 1955!
FACTORY-TO-YOU-VALUE
PORTABLE ELECTRIC LIGHT PLANT



ITEM # 1008

POWER TO OPERATE:
● Electric Saw, Electric Drills, Pipe Bender.
● Refrigerator, Deep Freezer, Incubator.
● Water Pump, Radio, Lights, Air-conditioner.

COMPACT—FITS IN THE TRUNK OF YOUR CAR

1000 WATTS OUTPUT, continuous duty. 115 Volts A.C. 60 cycles, 9 amps. Powered by husky, easy starting Clinton engine. Engine and generator operate at 3600 R.P.M. for maximum efficiency at minimum weight. Both units are mounted on welded base, with heavy sheet metal belt guard. Generator is self regulating, and is equipped with outlet box containing fuse and 2 A.C. convenience receptacles. Cost only 5c an hour to operate. Dimensions: Length 20½", Width 12", Height 16". Shipping wt. 100 lbs. F.O.B. Chicago..... **149.50**

Brand New! 5-TON BLACKHAWK
HYDRAULIC LIFT KIT

Now Only **38.95** Complete

THE COMPLETE KIT
For— ● Dumping farm wagons ● Adjusting depth of plows ● Hydraulic press ● Hydraulic jack ● Snow plows.

Item No. N-116-B

KIT CONSISTS OF:

1—Brand new Blackhawk Model P-151—Hydraulic hand pump with built-in oil tank and release valve. Rated from 1200 P.S.I.—to 8400 P.S.I. 20" handle. Dim. 8"x6"x6". **Item #82** **22.50**

1—6 Ft. length double wire braid rubber covered hydraulic hose—tested to 20,000 lbs. **Item #2794** **3.95**

1-Hydraulic cylinder, 2" bore, 6" stroke, husky 1" solid steel shaft, will lift 10,000 lbs., using pump pressure. Standard clevis mounting. May be used for double action service. **Item #41C1C** **12.50**

2-qts. non-foaming hydraulic fluid..... **1.00**

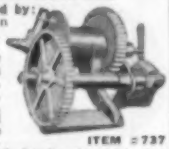
All necessary hydraulic fittings. Total ship. wt.—40 lbs.

COMPLETE KIT PRICE..... **38.95**
ALL OF ABOVE INCLUDED F.O.B. Chicago

GROBAN SUPPLY CO. Dept PS-7
1139 S. WABASH AVE., CHICAGO 5, ILL.

New . . . ALL PURPOSE
5-TON HAND WINCHES

IDEAL FOR:
● Tow Trucks ● Bricklayers
● Loggers ● Roofers
● Construction uses

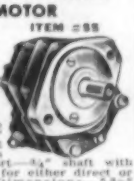


ITEM #737

Manufactured by: Seattle Chain and Mfg. Co. — Div. of Republic Steel. 5-ton capacity, single drum, 2 speed, compound gear, locable cam and lever type, with hand grip steel shoe brake and spring actuated steel safety dog. The drum has a 5" core, is 9" long, and has a capacity of 265 feet of ½" rope. Adjustable hand crank allows greater cranking speed.

DIMENSIONS:
22"x24"x16". Packed in wooden box—Ship. Wt. 200 Lbs. Regular Value $161.50. Now only **79.00** F.O.B. Chicago

MULTI PURPOSE
HYDRAULIC PUMP OR MOTOR



ITEM #95

Silent, high efficiency, Helical Gear Type Ball Bearing, Hydraulic Pump or Motor. Rated 8 Gal. Per Min. At 1500 R.P.M.—delivers 1000 P.S.I. Using 6 H.P.—Reversible Rotation—¾" Pipe Thread Inlet and Outlet Ports—¼" Drain Port—¾" shaft with keyway and flat for either direct or pulley drive. Dimension—5⅝" high, 7¼" long, 5⅛" wide. Shipping weight 18 lbs. F.O.B. Chicago **45.50**

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1955 EDITION, 52 pages, chuck-full of unsurpassed War Surplus Equipment Bargains for farm, home, factory, workshop. Write letter today.

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"How To Get The Most Out Of" your Power Tools. Clearly written, illustrated. New projects, ideas. Write for FREE descriptive folder: Delta Power Tool Division, Rockwell Manufacturing Company, 504-G North Lexington Avenue, Pittsburgh 8, Pa.

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NEWEST TARGET RIFLE-.22 IDEAL FOR SMALL GAME

ECONOMICAL
SAFE-NON-TOXIC
ACCURATE-CONVENIENT
PRACTICAL. Easy to operate—No spring recoil—No pumping. Uses low cost Soda Cartridges Cal. .22 Benjamin HG Pellets and Darts.

New Benjamin CO_2 *Rocket Gas* Pistol $15.00

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WRAP-ON STOPS DRIPPING PIPES INSTANTLY

Low cost • do-it-yourself Fiberglass Insulation

QUICK . . EASY TO USE
Stop rust and ruined floors caused by dripping pipes. Protect basement or "rec" room with 'WRAP-ON' fiberglass insulation and vapor seal tape. 1 Pkg. covers 17' of ½ pipe. Smooth surface takes paint.

● no dirt or muss, no tools
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● $1 at Dept & Hdw. stores

beware of imitations insist on 'WRAP-ON'

Wrap-On Co., Chicago 10, Ill. Dept. 70 A

For lawn mowers

New 3-in-one Oil-Spra lubricates all over—forms a barrier against rust! Press button for penetrating oil spray!

"3-IN-ONE" OIL

Speed up Repairs

on autos, bikes, lawnmowers, outboards, locks, plumbing . . . anything metal!

Remove RUSTY bolts

nuts, screws, "frozen" parts without breakage!

LIQUID WRENCH®

loosens rust and corrosion in seconds!

3 oz. CAN 30c

Cleans, Protects, too!

This powerful blend of quick-acting solvents is absolutely safe for all metals and alloys, even finest finishes. Wonderful for cleaning guns, rods, reels, metal equipment of all kinds. Helps prevent new rust and corrosion.

AT HARDWARE STORES, SERVICE STATIONS AND GARAGES EVERYWHERE

Stop Noisy, Leaky Toilets!

SEALMASTER® TANK BALL

Guaranteed 4 Years! 75c each

Quickly pays for itself in water saved. Easy to install. FITS ALL VALVES

AT HARDWARE STORES EVERYWHERE

Manufactured by

RADIATOR SPECIALTY COMPANY
Charlotte, N. C.

Littlest Ships Battle Super-Storms

[Continued from page 208]

Fred Upton, 57, does with his. He will let a high wave hurl his boat onto the deck of a sinking ship. There, his crew picks off survivors with hands and boat-hooks. Upton counts on another big wave to come along and sweep his boat off the deck of the wreck.

The Life-boat Institution was founded in 1824—not by passing a law—but by a man who volunteered. Sir William Hillary, a veteran of the Napoleonic wars, settled on the Isle of Man, saw its rocky coasts and shipwrecks, and learned the definition of a wreck of those days: anything from which "no living creature came ashore." Hillary passed the hat,

> ***All this talk about flying saucers is not new to some married men.***
>
> —THE SIDEWALK SUPERINTENDENT

bought a few rowboats, and the service began. He himself helped save 305 lives.

But lifeboatmen, because they are men, probably remember best not Hillary, but Grace Darling, a contemporary of his. Grace, who was luscious enough to be a pin-up girl, was 23 when she set the pattern of volunteer rescues that continues to this day.

Grace, the daughter of a lighthouse keeper, one day saw survivors clinging to the wreck of an early steamer. She made her father launch a rowboat with her, right into the gale. Grace and her dad rescued nine, got back alive themselves, and Grace eventually became a legendary figure in the British Isles.

Today the lifeboats are still supported, as in the days of Hillary and Grace Darling, by passing the hat. These days most all Britain contributes.

The number of "lives rescued," as the Life-boat Institution calls it, changes so fast these days that the Institution has a blank it fills out, with the latest number, and sends out with its outgoing mail. The total (for 131 years) in my last letter was 79,092. It will be considerably bigger when you read this. END

HERE'S famous Harley-Davidson quality at a new low cost. You can own the Hummer for only $17 per month!* And you ride for pennies . . . up to *100 miles per gallon of fuel.* You'll save time too. No traffic jams . . . no parking problems for the man with a Hummer. Join the smart, thrifty thousands who are getting more miles for their money. See your Harley-Davidson dealer today, or write for free, illustrated literature. The Harley-Davidson Motor Co., Dept. PS, Milwaukee 1, Wisconsin.

**Average after minimum down payment includes Federal tax; fire, theft and collision insurance; freight and carrying charges.*

the New HARLEY-DAVIDSON

HUMMER

Averages up to 100 miles per gallon

thriftiest transportation you can own!

The easy way to paint!

Speedy Sprayer

ONLY $36.50 Less motor

Favorite of home owners and craftsmen for 20 years! SPEEDY SPRAYER gives your work that professional paint finish everyone admires. Sprays paint, enamel, varnish, lacquer, etc. . . . 4 to 7 times faster than hand brushing! Lightweight, portable, uses any ¼ H.P. motor. Improved diaphragm principle assures clean, oil-free air. You'll find dozens of time and money saving uses for SPEEDY SPRAYER, including spraying insecticides 2-4-D and DDT. Complete outfit, without motor, only $36.50

At leading hardware, lumber, and auto supply dealers. FREE—*write for handy booklet "How to Spray."*

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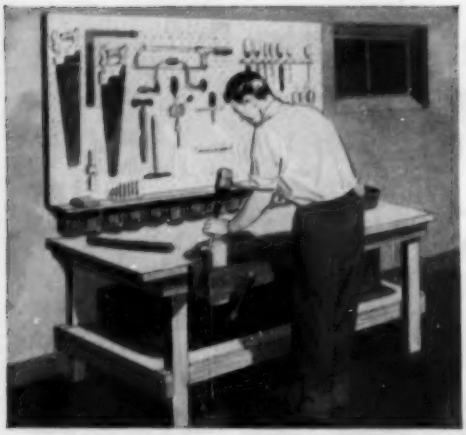
12-Star UTILITY PANTS With Shirts to Match ARE A BETTER BUY

Anvil Brand

Work comes easier when you "tool up" in comfort clothes

THERE'S more joy in any job when you slip into the relaxing ease of an Anvil matching suit. Stoop, reach, bend, twist—in any position there's comfortable freedom for action. Made of tough twills in choice of colors. Non-shrink waistband, foot-deep, double-lined safety pockets; every point of strain especially reinforced. Try out Anvil Brand for new satisfaction.

ANVIL BRAND FACTORIES HIGH POINT, N. C.



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Presdwood work bench and Peg-Board tool rack

New, easy-to-follow plans show how to build this sturdy Masonite Presdwood® work bench...how to hang this handy tool rack made of Masonite Peg-Board* paneling.

With smooth, sturdy Tempered Presdwood for work surfaces, you don't have to worry about splinters or slivers. This dense, knotless and grainless material will withstand a tremendous amount of bumps, dents, scrapes, yet won't harm work. Lasts for years.

Famous Peg-Board panel is readily fastened to any wall. Wide choice of hangers keeps tools within easy reach.

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PANEL PRODUCT OF MASONITE® CORPORATION

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Please send me your free plan, No. AE-312, and Masonite Presdwood "Idea Book."

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Address.....

Town.....Zone.....

County.....State.....

*T.M. REG. U.S. PAT. OFF., B. B. BUTLER MFG. CO., INC.

The Story of the Lincoln Continental

[*Continued from page 115*]

revving it up much. Difficulties with clogging lifters and sticking valves appear to be minimized if the engine is run briskly on well-used lube.

For a view of the Continental today, come take a ride with John Y. Fairbank, of La Grange, Ill. He's the owner of a steel-blue '48 cabriolet with its original innards. During the day Fairbank, a salesman, pilots his car through Chicago, always keeping it in second because of the V-12's preference for brisk revs. At

> ***When it comes to picking up speed from a stop-position, you can't beat a bus you've just missed.***
>
> —THE SIDEWALK SUPERINTENDENT

the end of the day, he heads it out toward the rolling country to his home, and the 18½-foot car whips along like wind through a wheat field.

A lover of sports cars, Fairbank is quick to point out that the Continental is no sports car. Still, it flats the highway curves with easy grace. This is a convertible but there isn't a creak in the bridge-floor body. Even with the shocks tied down, the car is as smooth as a skiff in a calm, once it tops 50 m.p.h. Only a hum comes from under the hood, and faintly you can hear that familiar Ford helical song from the rear.

Down the highway, it seems the Lincoln Continental will always remain a car never haughty but supremely assured.

In a few months, a brand-new Continental will be out to twang the buying nerves of the U.S. public. In view of the continuing admiration its elder brother has won, it may not have an easy row to hoe. As evidence of this, consider these remarks by a Lincoln executive:

"There has been speculation about the likelihood of a rear tire mount . . . I can say this much: if there is a tire mount on the rear of the new Continental, it won't be like anything that you can buy in a kit." END

MAKE WATER HEATERS LAST YEARS LONGER

WITH THE AMAZING NEW

McRAY ZINC ANODE

Made of zinc and copper on stainless steel core. Anode actually "zinc plates" inner surface of tank and adds years to life.

NOW ADOPTED BY MANY WATER HEATER MFGRS.

ASK YOUR PLUMBER OR ORDER DIRECT

For Gas, Oil, Electric LP Gas — 20-30 gal. tank No. PD30. $4.85 ea. To 40 gal. tank No. PD40. 5.80 ea. To 60 gal. tank No. PD60. 7.15 ea.

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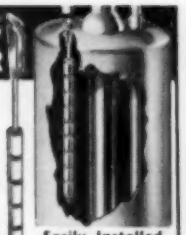

Easily Installed Insert in hot water outlet nipple. DO IT YOURSELF or ask your plumber. Send for literature.

SATISFACTION GUARANTEED OR MONEY BACK

Also McRay Protecto Rods for Auto Radiators $2 ea.

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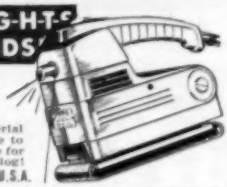
Guaranteed original equipment Replacement Auto Parts . . . at Western Auto

NEW SANDER L-I-G-H-T-S WORK AS IT SANDS!



Only Syncro "900" gives you all this: built-in work light—most powerful reciprocating sander motor (patented) and guaranteed against burn-out during ownership—removes more material with less upkeep—no twisty torque to tight—heavy duty—low cost. Write for FREE SANDING HANDBOOK. Catalog!

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NEW, IMPROVED CALCULATOR FOR WOODWORKERS only 25¢

Instantly gives information on lumber, nails, concrete mixes, painting materials, etc. Convenient, simple to read. Just set dial for nail specifications, to convert linear to board feet, find bit sizes for screws, compare characteristics of woods. 6" diameter heavily varnished cardboard. Send 25c, no stamps, please to Greenlee Tool Co., 2127 Columbia Avenue, Rockford, Illinois.

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WRAP TOOL HANDLES with tight-sticking "SCOTCH" 33 Plastic Tape. Makes smooth non-slip grip—resists water, oil, perspiration. Fine for shock-proofing frayed electric cords, mending rainwear, too. "SCOTCH" 33 Plastic Tape—39¢ or 79¢—on sale at stores everywhere. Minnesota Mining and Mfg. Co., St. Paul 6, Minn.

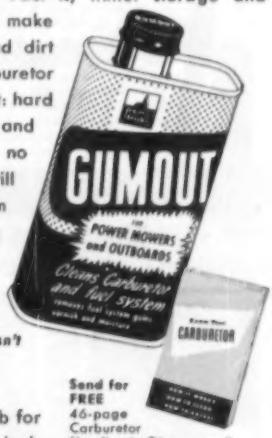
BALKY Power Mower?

SPUTTERING Outboard?

Clean the carburetor with...

GUMOUT

What's more maddening than a stubborn power mower or outboard? Fact is, winter storage and infrequent use often make them ornery. Gum and dirt build up in the carburetor and fuel system. Result: hard starting, rough idling, and *stalling*. And there's no adjustment that will compensate for gum and dirt. Only thing to do is clean the carburetor!



But—the carburetor doesn't have to be taken apart to clean it!

GUMOUT does the job for you—while the engine's running. Just pour a little GUMOUT in the gas tank. It dissolves the gum . . . cleans out the fuel system . . . keeps the carburetor as clean as new. There's nothing like GUMOUT!

Send for FREE 46-page Carburetor Handbook. Gives you all the answers. Good to have.

Your CAR needs GUMOUT, too. A dirty carburetor causes stalling, lazy pick-up, excessive gas consumption. Add GUMOUT to your gas tank every two or three months. GUMOUT cleans your carburetor while you drive.

GUMOUT is sold by service stations, garages, auto supply dealers, and hardware stores everywhere.

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The Only COMPLETELY TRANSISTORIZED MIRACLE GEIGER COUNTERS*

- Sensitivity: Indicates full scale on background count
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- NO VIBRATORS
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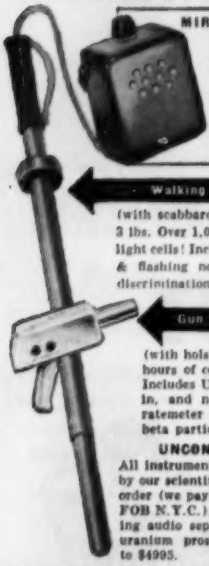

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—available separately at $15.
—adapts to ALL geiger counters

Amplifies detection clicks 10 times. Single 15c flashlight cell. 12 ounces. Size of cigarette pack cubed. Replaces bulky, irritating earphones. No drain on expensive geiger batteries—pays for itself in short time!

Walking Stick :UAC 402 : $99.50

(with scabbard). 40" x 2" overall. Weighs less than 3 lbs. Over 1,000 hours continuous use on 2-15c flashlight cells! Includes Universal's Transistorized Audio* & flashing neon light. Aluminum shield for beta discrimination.

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(with holster). Weighs less than 4 lbs. Over 500 hours of continuous use on 2-15c flashlight cells! Includes Universal's Transistorized Audio* built-in, and newly designed full view, free swing ratemeter wth 3 ranges. Aluminum shield for beta particle discrimination.

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Meet Wilson's NEW Hi-Drive motors—tiny yet powerful enough to motorize hobby items, toys, recording equipment, research devices, industrial models. Long motor and battery life. Other high-quality, low-cost items listed may help solve your motorizing problems.

*No. 7-100 Hi-Drive Motor, 1½-3V $2.00
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No. 3000 Vari-speed gear unit. $4.00

*Item illustrated. Ask for FREE Cat.

All Wilson's motors have Permanent Alnico V Magnets.

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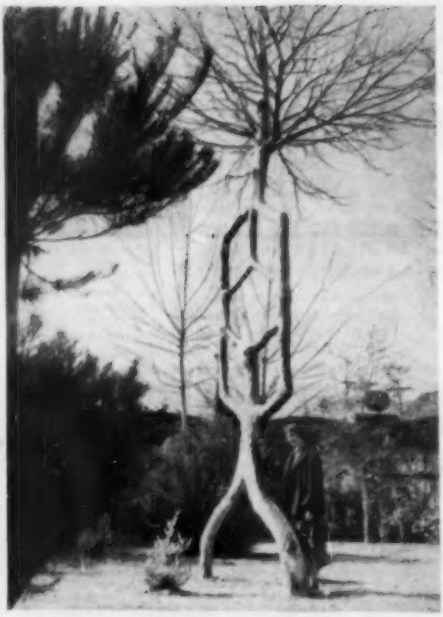

Tree Proves Old Adage

As THE twig was bent, this tree grew. Actually, it's two sycamores grafted together, trained in a geometric pattern and then allowed to grow normally at the top. It's one of 50 oddities at A. N. Erlandson's tree circus near Santa Cruz, Calif.

Prefab Makes Rover a Gay Dog

HERE's a doghouse with a canopied doorway for extra shelter and a raised entrance to keep the insulated floor draft-free. The one-piece roof lifts off to make cleaning a cinch. Webster Bros., Box 372, Guttenberg, Iowa, makes the Pup Hut in four sizes.

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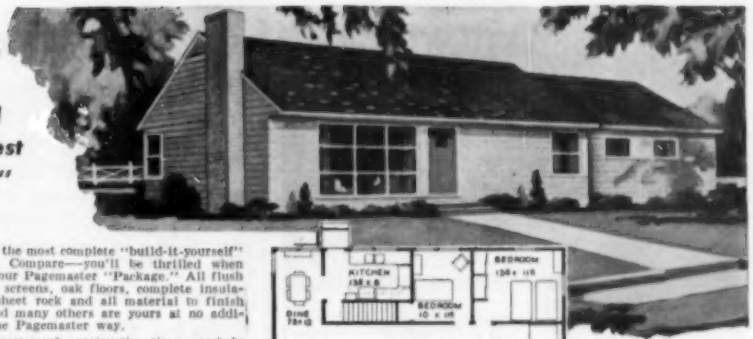

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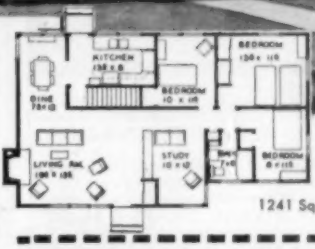

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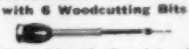

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Atomic Ruins Reveal Survival Secrets

[*Continued from page 52*]

than an earlier design had done two years ago. The prototype house was wrecked completely.

The strengthened house was still severely damaged and would cost a great deal to repair thoroughly. Too much, probably, to make reconstruction feasible.

However, after the explosion the basement was an impressive study in security. Its foundation looked as trim and firm as if it had just been finished.

Four shelters tested. The basement contained four different types of shelter. The biggest was a new design. It was 12 feet long and three feet wide. Its walls, six inches thick, were made of reinforced concrete. A lady mannequin who sat in it was still serene and unruffled the following morning.

Another shelter was a duplicate of the inexpensive wooden one that survived the destruction of the brick house on Doomsday Drive. A third was a simple lean-to. The fourth was made of corrugated galvanized iron on a frame of steel pipe. A layer of sandbags protected the top.

All the shelters had offered complete protection to the objects in them.

The most remarkable sight in that cellar, though, was a bank of open shelves along the rear wall. They had been carefully stacked with fat rows of canned, bagged, bottled and cartoned foods. After the fury that had nearly torn out the interior of the house above them, these rows hadn't budged. Not a single container was a hair out of alignment.

Industrial building stands. Encouragement for those who have machinery to protect as well as people was found 6,800 feet from Ground Zero. Here, one structure survived strikingly well between two that were almost demolished.

A steel-frame building roofed and walled with corrugated aluminum had been largely shredded. Still, a milling machine inside looked all ready to use.

A self-framing building made of chan-

[*Continued on page 218*]

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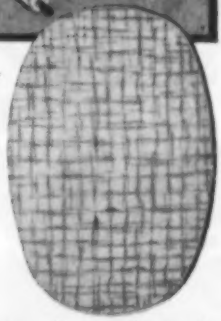

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CHUCKS
If it's a Jacobs it holds

Atomic Ruins Reveal Survival Secrets

[*Continued from page 216*]

neled-steel panels had been staved in. Yet a machine was seemingly workable.

The third building, a novel structure made by the Behlens, who helped America discover Columbus, Nebr. (PSM, Mar., p. 120), had had the front of its roof deeply dented and its sides noticeably poked; window frames were empty and its wood door had been split into kindling. But the building still stood firm and ready to provide shelter.

This novel building, which was self-framing, was of heavy, deeply corrugated panels of 16-gauge galvanized steel. They had been bolted to a concrete footing and to each other. The roof panels, which were duplicates of the side panels, had been bolted to the sides and to each other.

"If those steel panels were flat, they wouldn't support their own weight," said Walter D. Behlen, president of the company that makes the Behlen building. "Corrugating them increases their strength 1,000 times."

Tests at farther points. Duplicates of most of the residences and industrial buildings at the Test Site were set up at points still farther from Ground Zero. They showed lesser degrees of damage.

Scores of other tests were simultaneously made in the flame and thunder of Doom Town's apparent end. For months the reports will be coming in on the effects of that particular atomic explosion on clothing, utility equipment and connections, paints, foodstuffs, indoor and outdoor shelters above the ground and under the ground, communications equipment, record storage, trailers, emergency vehicles, radiological monitoring techniques and other vital matters.

Doom Town will unquestionably be proven to have been a Survival City of historic importance. END

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ALUMINUM—make place or counter mats; cover anything with aluminum.

CLOTH & PAPER—apply cloth of any kind (canvas, upholstery material etc.) to wood, composition board or metal. Fasten paper to paper or anything else.

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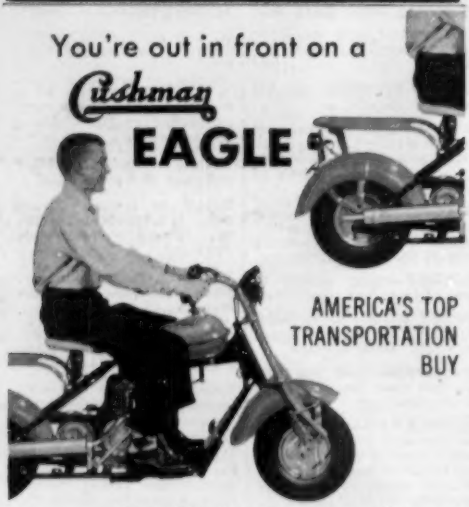

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How to Enjoy Skin Diving

[*Continued from page 68*]

wards, for that seal went up for air three times before I did.

Of course, in cold water I can't stay down even a full minute. The cold drains energy, saps strength, numbs your brain and makes it difficult to react.

In the warmer waters of summertime, though, you are more relaxed and can stay under much longer. You can even descend to a depth of 55 feet, if you see something sufficiently interesting to make you forget the pressure.

One skin-diving friend of mine went down 80 feet, but he had just dropped his brand-new $30 spear gun and was determined to retrieve it from the bottom. The dive exhausted him so, it took him two days to recuperate.

Skin diving at night is a special thrill. A few of us engage in this sport off the beaches of Southern California.

I go under with a waterproof flashlight to guide me. It's a fine technique for catching lobsters, which come out of the holes they hide in during the day and feed in the open at night.

A favorite hunting ground is off Redondo Beach, where there is an old sunken wharf. The pilings lie about 15 or 20 feet below the surface. Lobsters sit on the tops of those pilings, stare at the flashlight, and wait to be picked up.

In our California waters, there are dangerous forms of marine life, but they are not the well-publicized ones. Sharks invariably avoid you. Octopuses leg it away as fast as they can. The only reason I got bitten by one was that I had clamped him to one wrist to bring him ashore. I didn't know then that his jaws are on his underside. It felt like a big hypodermic needle.

Moray eels have needles in place of teeth, and they hang out in holes that lobsters frequent. But a moray is not likely to bite you unless you stick a hand right in his mouth when reaching for a lobster or an abalone.

Sting rays are not a hazard except when you are entering or leaving the

[*Continued on page 222*]

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How to Enjoy Skin Diving

[*Continued from page 220*]

surf, and then only if you step on one. Like scorpions, some species can curve their stingers like a whiplash, and they are excruciatingly painful. But you can scare them out of your way by shuffling your flippers through the shallow water.

Sea urchins look like pincushions with purple spines sticking out of them. They cling to rocks and lie in holes. If you step on one, or brush against it, the spines are likely to break off in your flesh.

My own most hazardous adventure under water, though, did not involve any of these easily avoidable dangers. I asked for trouble.

Off Guaymas, Mexico, on Thanksgiving Day in 1953, about 20 feet below the surface, I swam up to an enormous broomtail grouper, one of the world's ugliest fish. He lazily watched me get within two or three feet. From there, though I felt as if I were shooting a fish in a barrel, I fired my spear gun.

The instant that big buzzard was hit, he took off like an express train. And, believe me, under water he sounded like one, too, as the huge tail flailed around. The spear was firmly embedded, as you might guess, and I was being hauled along so fast that I could hardly think.

I might have been carried down too far, or lost my prize fish, if I had not had a safety line on the spear gun. The violent tug of the fish released this automatically, giving me 50 feet more leeway. I still had enough presence of mind to remember to angle my body upward. Thus, with the extra line, the fish planed me right up to the surface. I still had a long, hard fight on my hands before I landed him—a 92-pounder—but at least I now could gulp air.

When it was all over, I nearly collapsed from fatigue and excitement. But I'd probably do it again. That's how skin diving gets you! END

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● **Army Wool Sleeping Bag** ($12.50) **4.29**
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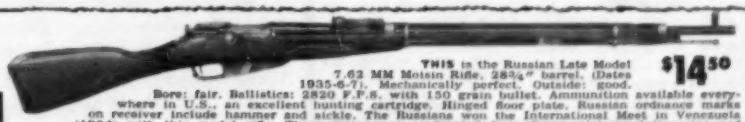

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MODERN MFG. CO.
160 N. FAIR OAKS, PASADENA, CALIF.

Test Proves Fluoride Saves Teeth

[Continued from page 122]

ly organized dental society of Colorado Springs, Colo., decided to investigate a mottled condition of the teeth known then as "Colorado brown stain." The society soon discovered that the trouble occurred only among children and adults who had lived in the Colorado Springs area during their first eight years, the period of tooth calcification.

The same condition was found in many other communities and definitely traced to the drinking water. But it was 1931 before chemists found out what was causing the mottling. In the aluminum town of Bauxite, Ark., mottled enamel had made its appearance shortly after the installation of a water system based on three artesian wells. The company sealed them off and tapped a river instead. Meanwhile it sent samples of the well water to its laboratories at New Kingston, Pa., where chemists were surprised to find fairly heavy traces of fluorine compounds, or fluorides.

The payoff came in 1938 when two dental authorities went to Bauxite and found that teeth of children born after changing the water were much more liable to decay.

Here was a new mystery: large traces of fluoride would stain and pit the teeth but at the same time protect them remarkably well from decay. Question: was there any way to get the good result without the bad?

To find out, the United States Public Health Service investigated a number of communities whose water contained fluorine. The content ranged all the way from less than one part to more than eight parts of the fluoride ion per million parts of water. Where it was at least one part per million (p.p.m.), the children had only one-third as many cavities as children drinking fluoride-free water. And their teeth were not disfigured if the fluoride content did not go beyond one and a half to two p.p.m.

The results of the Newburgh-Kingston experiment are on the record. Every

[Continued on page 226]

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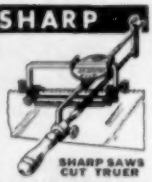

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Test Proves Fluoride Saves Teeth

[*Continued from page 224*]

year the elementary grade pupils—about 3,200 six-to-12-year-olds in Newburgh and the same number in the control city, Kingston—have had their teeth examined. Then dentists have computed the so-called DMF rate. This is the number of teeth that are decayed, missing, or filled for every 100 permanent teeth that have come through.

At the beginning of the experiment, the DMF rate for Newburgh was 20.6. For Kingston, it was almost the same—20.2. After fluoridation began in Newburgh, the rate in that community went steadily down. In 1953-54 it stood at 9.8. But in Kingston, where nothing was done to the water, the DMF rate was 23.7.

Results in other cities. The Newburgh results are much the same as those in other communities that have added fluoride. In Grand Rapids, Mich., there was an eight-year drop in decay ranging from 25 percent in the case of the 16-year-olds to 71 percent in the case of the six-year-olds. This was for the permanent teeth. In Brantford, Ontario, dental decay dropped 20 percent in four years for the 14-year-olds and 56 percent for the six-year-olds.

So far it is the young children who have profited most, simply because they, more than the others, have had the fluoridated water during the period when it affects the teeth.

But once conferred, the benefit seems to last. In Boulder, Colo., a group of adults, 20 to 45 years old, had an average of 17 decayed, filled or missing teeth apiece. Boulder's water contains no fluoride. In Colorado Springs, where the water has 2.6 p.p.m., the average count was only 7.5.

Outlook for future. In a fluoridated community, then, tomorrow's adults should have considerably stronger teeth than today's, which will mean that dentists will have a fighting chance to catch up with the demands on them.

Some dentists mildly oppose fluorida-

[*Continued on page 242*]

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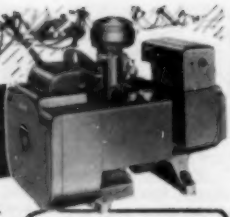

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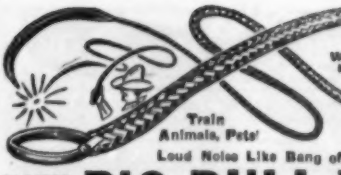

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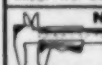

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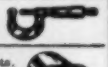

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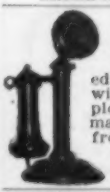

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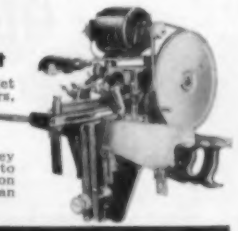

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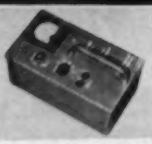

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750-16(6)	7.55	800-15	5.95	600-20	9.05	1000-20	17.95
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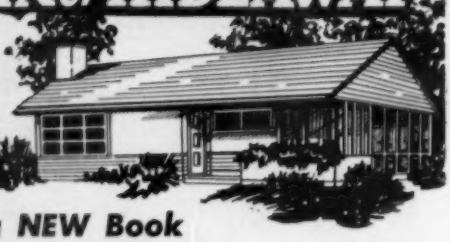

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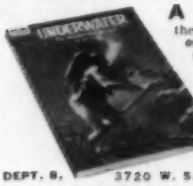

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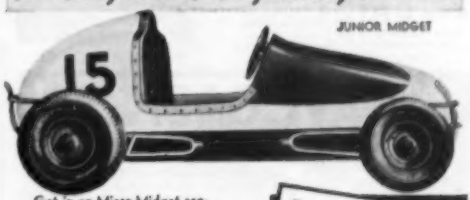

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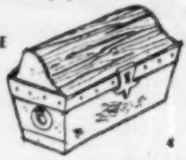

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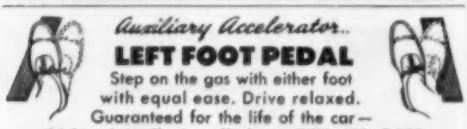

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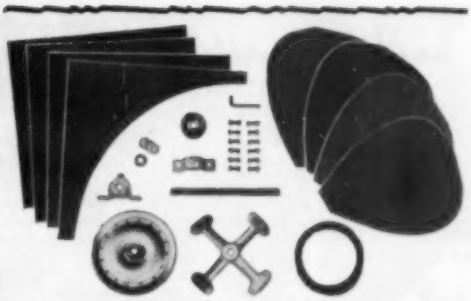

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FREE TIRES If you buy 2 or more — This pictured handsome tire ash tray included with 2 or more tires! you get an extra tire FREE. Be wise! Why buy only one! (not W.W., Truck or "Co. Release" tires)

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600-16	$4.81	640-15	$4.81	750-15	$4.71	820-15	$5.31
650-16	4.71	670-15	4.71	800-15	5.11	700-15	4.51
700-16	5.21	710-15	4.71	SPECIAL WHITE WALLS $2 Extra			

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650-20	8.81	900-20	19.61	650-16(6)	6.51	700-17	7.91
700-20	9.11	1000-20	15.81	700-16(6)	7.21	750-17	9.91
750-20	9.91	1100-20	17.51	700-15(6)	7.21	1000-22	16.81

SPECIAL! TIRES RELEASED BY CO. ADJUSTERS (just used slightly) If a tire proves defective at anytime, I charge you nothing. | World's top value and FREE TUBE! **$7.86** any car

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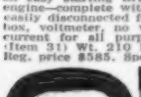
Don't be embarrassed by loose false teeth slipping, dropping or wobbling when you eat, talk or laugh. Just sprinkle a little FASTEETH on your plates. This pleasant powder gives a remarkable sense of added comfort and security by holding plates more firmly. No gummy, gooey, pasty taste or feeling. It's **alkaline** (non-acid). Get FASTEETH at any drug counter.

PORTABLE LIGHT PLANTS

GIANT 2000-2500 WATT PLANT

110-120 v. 60 cyc. AC. absolutely the best made — exclusive dynamically balanced armature; heavy windings develop up to 5000 watt overload for motor starting. Skid mounted — portable. Powered by an easy starting Briggs or Wisconsin 6 HP engine—complete with all accessories; engine easily disconnected for other uses. Big outlet box, voltmeter, no wiring necessary. Ample current for all purposes. Factory warranty. (Item 31) Wt. 210 lb. Reg. price $585. Special at..... **$299.50**



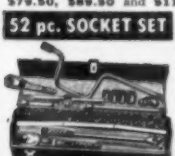
EXTENSION CORD

Heavy duty and very flexible. Neoprene 14-2 cable, 20 year quality. Wt. 12 lbs. (Item 185) 100 ft. Complete with rubber plug and outlet. A terrific buy at only **$8.95**

Variable Speed Selector

Heavy duty, made by **B. F. GOODRICH** for industrial use. Provides instant speed changes for any drive. For machine tools, dryers, printing, conveyors, production lines, hoists—any operation requiring variable speed. Employs reliable "trouble free" planetary system. No hydraulic power losses. Infinite range, smooth operation, easy installation. 3 sizes: ½-1 hp. 36 lbs.; 1-2 hp. wt. 55 lbs.; 2-3 hp. wt. 105 lbs.; Reg. list $228, $252 and $352. Our prices **$79.50, $89.50 and $114.50** (Item 68)

52 pc. SOCKET SET



Highest quality, guaranteed nonbreakable sockets made by Husky. Beautifully matched chrome thin wall alloy absolutely the best. Contains a complete set of 28 sockets in ½" drive, ⅜" drive and ¼" drive, plus all necessary extensions, handles, speeders, reversible ratchets, etc.; all uncond. guaranteed against breakage. A beautiful set of tools that will handle any job; in a big doghouse steel box. Wt. 17 lbs. (Item 205) List price $62.90. Factory special.. **$27.95**

get **BEDROCK** factory prices from **MASTER MECHANIC**

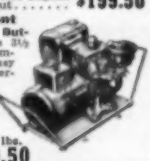
(Item 24)

600-700 WATTS PUSH BUTTON START

115 v. 60 cyc. AC Powered by a rugged 2 HP easy starting Briggs engine. No wiring necessary; just plug in and operate. Plenty of current for any oil burner, freezer, brooder, emergency lights, etc. which require up to 700 watts. Ideal for television and radios. Complete with Voltmeter and built-in winding to charge 6 v. auto batteries. (Item 24.) Wt. 75 lbs. Easily fits in car trunk. Be prepared if storm knocks out power lines. Reg. $275 value..... **$143.50**

1000-1200 Watt Plant (Item 45) same as Item 24 but larger generator and engine with 50% greater output..... **$199.50**

1300-1500 Watt Plant 115v. 60 cyc. AC Push Button Start. Powered by a 3½ HP. Clinton engine. Combines big output with easy portability. Provides emergency power for operating any oil burner, sump pump, freezer, television, lights, communications systems, etc., which require up to 1500 watts. (Item 22) Wt. 110 lbs. Reg. $475 value. Factory price... **$239.50**



1750 Watt Plant Powered by 4.5 Briggs engine. Electric starting & battery charging built-in! Factory price **$279.50**

MASTER-LITE 2500 Watt Plant 110/120 v. 60 cyc. AC. A powerful plant, ruggedly constructed and yet designed for easy portability. Can be started by rope or built-in 12 v. electric push button starter. Built-in winding to charge battery. Powered by a big 5.10 HP Briggs engine, complete with all accessories. Includes control box, voltmeter, and handy plug-in power receptacle. An ideal plant for permanent or stand-by service. Wt. 225 lb. Reg. price $645.00 (Item 21) Factory Price **$329.50**

(Item 21)

3500 Watt Plant Push Button Start (Item 23) 115 v. 60 cyc. AC. Similar to above, but larger and 33% more capacity. Wt. 270 lbs. Reg. $760. Factory Price..... **$379.50**

Dual Voltage 110/220 available for above plants for $30.00 additional.

FROM FACTORY TO YOU

HI-FLO Centrifugal PUMP

Completely self-priming! No foot valve required. Tremendous capacity—100 gal. per min.! . . Special impeller enables pump to handle muddy or sandy water. Simple to operate—simply start engine and watch the water go. Powered by a rugged, easy-starting 2 HP Briggs engine. Prelubricated sealed bearings for years of heavy low-cost service. **Big 11½" Model**, Item 502 Wt. 70 lbs. Factory price.... **$134.50**

2" Model (150 gal. per min.) with 2½ HP engine. Item 502a. 90 lbs. Fact. Spec. **$156.50**

JET STEAM MASTER

No., a super efficient portable steam generator that produces live steam at 100 lbs. pressure in 60 seconds from a cold start! Produces large volume of high pressure steam on 2 pints of fuel oil. Instantly cleans sticky grease, dirt, rust, old paint, etc. off implements and road machinery. Pays for itself in a few weeks. Sterilizes soil. Sterilizes as it cleans—milk equipment, etc. Fully automatic—oil fired with new, built-in lifetime bronze water circulating pump. Draws water from faucet or bucket. Simple and safe—anyone can use it; built-in safety valve. Complete with 12 ft. of hi-pressure steam hose and new triple efficiency steam gun that automatically mixes in soap solution if desired. Wt. 250 lbs. Item 463. Special factory price..... **$329.50**

HEAVY DUTY D-C ARC WELDER

with mounting flange (Item 38)

Use as portable or shop welder. Up to 300 amps. Senior model. Made for years of trouble-free, continuous service. Will handle light or heavy jobs. Easily welds up to ¾" plate using ¼" rods. Built-in air cooling system. Arc is easy to strike and hold, because of specially designed arc stabilizer. Hi-lo switch and dial control gives wide range of welding heats. Run welder at 3600 rpm. with tractor, jeep or 15 hp. gas engine, or 7 hp. elec. motor. Complete with instructions, guar. and triple V belt or flat pulley. You can pay more, but you can't buy a better arc welder. Wt. 110 lbs. $400 value **$119.50**

WELDING KIT Two 10 ft. leads, welding helmet, electrode holder, ground clamp. Sold only with welder at... **$10.50**

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Leading nationally known and foreign made products. Inspection tested at money saving prices. Underwater Breathing Apparatus, Swimming Masks and Fins, Diving Masks, Spear Guns, Water Skis, Diving Suits, etc. **Send 25c for Illustrated Catalog.**

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AT HOME • SPARE TIME • FOR FUN AND PROFITS!

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BIG PROFIT making Concrete Drain Tile

Millions of dollars' worth of drain tile are used every year for farm drainage, building construction, reclamation projects, highways, and other purposes. And the big swing is to concrete tile because it's better and costs less. Sales potentials are BIG.

Concrete drain tile is locally manufactured of local materials, for direct selling to local users or contractors. Useless costs—freight, distribution, breakage—are eliminated. While worth more than clay tile, concrete tile can sell for less and still earn a handsome profit.

Tile made on the Champion Machine are strong and uniform. Truly round. All sizes up to 12" diameter. Easy to make because the Champion is simple to operate.

Get The Champion Facts

Write for the Champion book. Tells about concrete drain tile as an outstanding manufacturing opportunity. Describes the machine and outlines liberal payment terms.

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[Continued from page 226]

tion on the ground that it makes people forget the real issue. "You can cut down decay," one of them argues, with plenty of scientific evidence to back him up, "simply by not eating sweets." He thinks that logically the campaign ought to be, not to add fluoride to our diet but to cut sweets out of it. That's a mighty strong point. Unfortunately, to quit eating candy takes will power.

The arguments and emotional displays have confused a lot of us.

In 10 years the number of people drinking water to which controlled amounts of fluoride have been added has risen from zero to 20,200,000. More than 1,000 communities now have fluoridated water supplies. Some 350 other communities with a population of 14,000,000 have approved fluoridation but haven't yet put it into effect. (Another 3,500,000 people in 1,100 communities have water that naturally contains from 0.7 to 2.0 p.p.m. of fluoride.)

Nevertheless, when fluoridation has been put to the vote of all the people—and not just the boards of health and town councils—it has been accepted in 85 communities and turned down in 105. It's a pretty safe bet that some other communities will vote no, too.

What you can do. If you want the benefit of fluoride treatment but find yourself voted down, here are some hopeful facts:

Your dentist can give the children's teeth some protection by swabbing a fluoride directly on the teeth. Several treatments will be necessary. They probably won't be as effective as the fluoridation of water, but they will certainly be better than nothing.

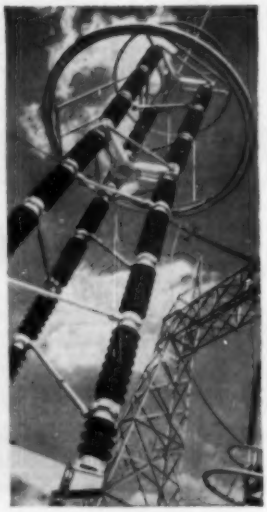
On the basis of the first reports, a new toothpaste containing stannous fluoride reduces decay in both children and adults.

Finally, if you get into an argument about fluoridation, you can quote Dr. James H. Shaw, of the Harvard School of Dental Medicine. He says: "No other health procedure in the annals of history has been so thoroughly tested in field trials under the widest variety of controlled circumstances." END

NEXT MONTH... **10 Years from Hiroshima**

1945 1955

AUGUST 6 is the tenth public birthday of the Atomic Age, the fastest-moving age the world has ever seen. POPULAR SCIENCE MONTHLY will mark the occasion with a special section devoted to atomic energy—its exciting past, its promising future. You'll find dramatic picture reminders of the history you have seen happen. And you'll read the inside story on atomic electricity, now emerging from small research toys into plants capable of lighting big cities.



SAVE 50% DO-IT-YOURSELF

Genuine Select PHILLIPINE MAHOGANY LUAN PLYWOOD

BUY DIRECT FROM IMPORTER

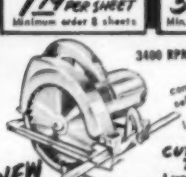
Ideal For Fine CABINET WORK, FURNITURE, Paneling DENS, OFFICES, HOTELS, etc.

Our prices are LESS THAN DOMESTIC PLYWOOD at WHOLESALE. This selected LUAN MAHOGANY meets the most rigid specifications. It is WEATHER and WATER RESISTANT. You'll be amazed at the beauty of this fine wood. Its rich golden elegance will thrill you. Rotary cut for beauty of grain. Both sides sanded and ready to use. Bonded with finest resin adhesive. Face side unjointed.

See for YOURSELF FREE SAMPLE on request!

Available in three thicknesses – 3mm (approx. 1/8"), 4mm and 1/4". ALL orders shipped by special Truck for lowest rates. No order accepted for less than 100lbs. – equal to (4) 1/4" sheets, (6) 4mm sheets or (8) 3mm.

3mm (1/8") x 3ft. x 6ft. – $5.00 value.	4mm x 4ft. x 8ft. – $7.50 value.	1/4" x 4ft. x 8ft. – $9.50 value.
1.79 PER SHEET Minimum order 8 sheets	3.89 PER SHEET Min. order 6 sheets	4.49 PER SHEET Min. order 4 sheets



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compares to saws selling up to $39.50 Ideal for HOME or SHOP

NEW

RIPS – CROSSCUTS

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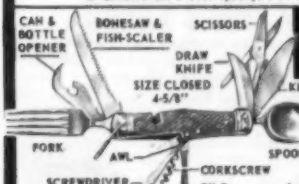
A rugged, professional type, adjustable saw. Cut any angle, 0 to 45°. Has adjustable (0 to 6") rip fence. Safety-trigger switch on handle. Full ½ HP Universal AC-DC, 110-120 Volt, 60 cycle motor. Weighs 6½ lbs.

EXTRA SAW BLADES – Available in Rip, Crosscut or Combination. Please specify. . . . . price each 2.95



12 PC. IMPORTED SPORTSMANS KNIFE

A COMPLETE CAMP KIT ONLY 4.95 $12.95 VALUE

complete with genuine leather holster!

Here is the perfect combination Knife-Tool for every Outdoor Sportsman, Hunter, Camper, Fisherman, Boy Scout, Prospector, Rancher, etc. Think of it !! 11, fine quality Steel Tools, precision made to fold easily into the heavy bone covered body. In one neat, compact unit you have (1) a regular knife, (2) a fork, (3) spoon, (4) draw-knife, (5) bone saw & fish scaler, (6) scissors, (7) can & bottle opener, (8) cork-screw, (9) awl punch, (10) screwdriver, (11) a metal file. All this PLUS a genuine leather Belt Holster. ORDER NOW while we can still guarantee delivery!

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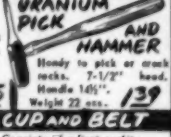
ARMY WATERPROOF **BEDROLLS** 4.95

Large 80"x36" heavy duty duck canvas bedroll. Has roomy pockets in each end to hold extra gear. An ideal enclosed ground cloth for a sleeping bag or air mattress. With (3) 8ft. straps & buckles.



URANIUM PICK AND HAMMER 1.39

Handy to pick or crack rocks. 7-1/2" head. Handle 14½". Weight 22 ozs.

ARMY CANTEEN, CUP AND BELT 2.59

Genuine U.S. Army equipment. Consists of a first quality 1 quart Canteen and aluminum Cup with folding handle, both of which fit snugly into an insulated canvas cover. Cover attaches to web type pistol belt ONLY

MARINE BOLO KNIFE AND CASE 1.98

Made of top quality Vanadium steel. 15" long. Ideal for clearing brush. With sturdy belt sheath.

U.S. ARMY MACHETTE 1.98 NEW

Has 18" Vanadium steel blade. A hardwood handle. Sturdy belt sheath. 23" overall . . .

NEW, IMPORTED, SELF GENERATING CAMP STOVE

Smallest, most compact, yet entirely practical cooking stove you've ever seen. NO PUMPING – NO PRIMING necessary – entirely self-generating. Has collapsible grill for frying pan or coffee pot. Burns 2-1/2 hours on one filling of regular gas. ALL BRASS construction. Weighs 12ozs. Ideal for Prospector, Camper, Hiker, Picnic, etc. Guaranteed 1 year. 3.98

SAVE UP TO 50% ON SPORT DIVING EQUIPMENT

BUILD YOUR OWN DIVING LUNG – SAVE up to $100. Our special folder contains complete instructions showing how it's done. Kit includes – Air Bottles, Pressure Regulator, Hoses, Safety Belt, Shoulder Harness, Clamps, Mouth Piece, Valves, etc. . . . . .

Price for above kit . . . With 2 Bottles (1 hour time) 45.95 $150.00 value

FREE CATALOG Has latest info. on Diving Equipment. Plus an illustrated and described article on "How to build your own Diving Lung".

PALLEY BARGAINS IN DIVING EQUIPMENT

GENUINE AH-6006-1 Type DILUTOR DEMAND PRESSURE REGULATOR Recommended type. Gives proper regulation of air on demand. . . . 10.95

NEW (12.95 VAL.) AIR HOSE ASSEMBLY For use with pressure regulator. Has vulcanized mouthpiece. 5.95

CARTRIDGE BELT Pockets allow distribution of ballast weights around waist. 89¢

COMPRESSED **AIR TANKS** I.C.C. approved and dated. Will stand pressure of 1800 PSI

22 cu. ft. cap. (30 min. time limit) . No valve . . 9.75

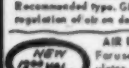
38 cu. ft. cap. (45 min. time limit) . No valve . 12.75

48 cu. ft. cap. (1 hour time limit. Without valve. ONLY 15.95

CONTROL VALVE for above bottles. $3.00

TWO-TANK CONNECTOR – Doubles diving time. 4.95

SINGLE TANK CONNECTORS – $3.95

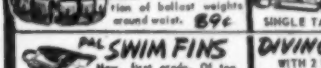


PAL **SWIM FINS** NEW Now, first grade. Of top quality flexible rubber with treaded bottom and adjustable heel strap. Will float and are fully vented for speed and protection. Vented for air and drainage. Sizes: Small, Med., Large. 2.99

DIVING MASK WITH 2 BUILT-IN **SNORKLE TUBES** The famous Medusa mask. Fully covers both mouth & nose. Top quality. Has Two built-in snorkle breathing tubes. 8.95 NEW

DIVING MASKS Made of gum rubber with a sturdy glass lens and adjustable head strap. A Bargain! SMALL 99¢ MED. 1.49 LARGE 1.89

NEW FROGMAN SUITS Of finest quality seamless Latex rubber. Two piece type. Factory seconds with minor imperfections, but guaranteed. With either long or short arms and legs. Please specify. $54.95 val. 24.95



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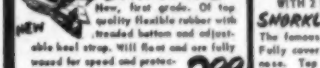
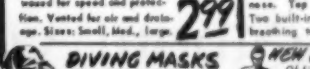
1 MAN 22.50 7 MAN 69.50 10 MAN 115.00

COLLAPSIBLE OARS 1.25 EA.



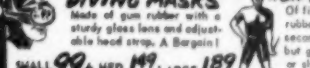
ARMY NAVIGATORS MAGNETIC COMPASS Originally used as standard navigational equipment on an Army airplane. Has rotating verge range ring, calibrated in 1 degree increments from 0 to 360°. Two parallel grid wires for N-S alignment. For airplane, boat, etc. 12.50

ARMY LENSATIC COMPASS 3.95 5.95 VAL. For hunter, camper, hiker, surveyor, Boy Scout, etc. Use for map orientation, azimuth reading or as a guide on unfamiliar terrain. Has 360° rotating bezel ring marked in 3° notches. "Peep" sight for sighting objects.



U.S. NAVY CHEST WADERS Made to top Gov't specifications of finest quality rubber with warm felt inner lining. Comes up to your chest. Have built-in boots, shoulder straps & vulcanized seams. $25.00 value. Sizes: Med., Large. 7.95 NEW

NEW NAVY **WADING BOOTS** A Surplus Bargain. Made of top quality, rubberized NYLON – vulcanized to Latex rubber shoe. Shoe is insulated against cold and has grip-tread sole. Boot is thigh height. Order one size larger than shoes. (Sizes: 8, 9, 10. 3.49



NAVY WADING SUIT Makes Surf or Deep Stream Fishing a pleasure. Also ideal for use when it is necessary to protect the body or clothes from mud, moisture, etc. Made to top Gov't specifications. Originally made for use in landing operations. Of heavy duty rubberized canvas with vulcanized seams. Built-in rubber boots & gloves. Sizes: Med. & Lg. A $35.00 VALUE 9.95 NEW

ARMY STEELFRAME RUCKSACK NEW Army Ski-Trooper Rucksack made of heavy duty duck. Has one large and 2 small compartments. Adjustable straps and bindings. Mounted on lightweight, comfortable, all-steel tubular frame. Ideal for hunter, hiker, boy scout, prospector, etc. . . 8.95

ORDER FROM THIS AD. Pay by Money Order or Check. 1/2 deposit with C.O.D.s. P.O.s accepted from D&B firms. All prices F.O.B. Los Angeles.

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They're talking about you . . . about your future. You don't have to hear to know what they're saying. Because there's nobody who knows more about you and your present job than *you*.

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